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ABSTRACT

The instructional theory presented in this document provides an explanation and context for making instructional decisions. The theory's purpose is to facilitate continual inquiry in the real world of teaching; to facilitate the decision making role of teachers and researchers; and to enable teachers and scholars more clearly to describe and explain schooling. The theory is organized into three sections: (1) a rationale and justification for four kinds of statements found in the theory; (2) an outline of those four kinds of statements, which include empirical, logical, and normative instructional principles combined with a set of dilemmas inherent in using the principles to instruct; and (3) an elaboration of the principles and statements found in the outline. The logical principles are based on definitions of instructional objectives, and the normative principles are assumed to reflect the norms of democratic and intellectual communities. Dilemmas are inherent to any application of a set of principles; combining principles of instruction with the dilemmas that develop in applying the principles facilitates a sufficient description of reality to approximate reality and enables practitioners to anticipate the resolution of difficult dilemma conflicts and reduce the debilitating effects of those resolutions. (Author/LL)

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AN INSTRUCTIONAL THEORY:

A Practical Context for Instructional Decisions

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2

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AN INSTRUCTIONAL THEORY: ABSTRACT

This instructional theory has three sections. Section one consists of rationale and justification for the four kinds of statements found in the theory. Section two consists of an outline of those four kinds of statements which include empirical, logical and normative instructional principles combined with a set of dilemmas inherent in using the principles to instruct. Section three consists of an elaboration of the principles and statments found in the outline. Some of the empirical principles are thoroughly researched and well accepted. Some are speculative and inherently difficult to research. The logical principles are based on definitions of instructional objectives and are intended to conform to the epistemological rules for ways of knowing. The normative principles are assumed to reflect the norms of democratic and intellectual communities. Dilemmas are inherent to any application of a set of principles, but most of the dilemmas posed in this document were postulated by the Berlak's (1981) in their attempt account for the discrepancies they observed when they compared instruction in British Infant Schools with the principles of instruction on which the schools were founded.

Combining principles of instruction with the dilemmas that develop in applying the principles is the reason why this document was labeled a theory rather than an outline of principles. It facilitates a sufficient description of reality to approximate reality and it enables practitioners to anticipate the resolution of difficult dilemma conflicts and hopefully reduce the debilitating effects of those resolutions.

AN INSTRUCTIONAL THEORY:

A Practical Context for Instructional Decisions

The purpose of this document is to provide an explanation and a context for making instructional decisions. Explaining is an important function of theory, so using "theory" in the title seemed appropriate. The ultimate test of whether this theory serves its purpose is whether it facilitates continual inquiry to test it against the reality of teaching, whether it facilitates the decision making role of the teacher and research role of the scholar and whether it enables teachers and scholars to more clearly describe and explain schooling.

Good theory explains some phenomena, (Nagel, 1961; Toulmin 1960) enables prediction, (Beard, 1934; Merton, 1957; Mills, 1959) and conforms to the following criteria:

1. It is expressed as simply as possible. (Bower & Hilgard, 1981; Snelbecker, 1985)

2. It is empirically verifiable. (Gordon, 1968; Popper, 1961)
3. It is capable of being disproved. (Popper, 1961)
4. It is consistent. (Nagel, 1961)
5. It comprehensively accounts for all the phenomena encompassed by the theory. (Gleick, 1988; Nagel, 1961)
6. It facilitates communication between its potential users.

The list of criteria for good theory could be expanded, but even with this list, this theory falls short in a number of ways, so rather than lengthen this document with a discussion of specific criteria for adequate theory, the focus of this document will be to state the theory with

acknowledgements where criteria are not met so readers and colleagues can pose alternative or improvements.

The theory will consist of an outline of three kinds of propositions followed by an explanation or expansion of these principles. The three kinds of propositions are 1. Empirical principles. 2. Normative principles, and 3. Dilemmas that result from the application of any combination of empirical and normative principles.

Empirical principles are principles which are stated as if they can be validated by empirical observation. Not all of them will have been empirically verified, but hopefully they will be expressed so that with adequate research they could be confirmed or dispelled. This kind of principle is common to most theories, so this part of the discussion will not expand that definition.

Ethical or normative principles are principles that generally use a verb such as "should" or "ought" to convey a rule or standard. A teacher should be truthful or a teacher should give all students equal opportunity to learn are examples of ethical or normative rules about teaching. Scientific theories do not include ethical or normative propositions, so including this kind of principle announces that this theory will be a mix of normative principles and scientific principles rather than a completely scientific theory. It is necessary to include norms in an instructional theory because instruction requires action and action in any community is constrained by the normative rules of the community. The scientific principles in this theory are validated by empirical observation, but normative principles can not be validated by empirical observation. The validation of normative principles in democratic societies is accomplished through the consensus or vote of the group or the community being served by the rule.

(Toulmin, 1960) Electing school board members, conducting needs assessments and conducting public opinion polls are procedures used in democratic societies to validate the normative elements of the schooling process. Validating normative principles in communities that share a common religious position broadens the validation base to include God and dialogue with God. The intellectual communities of the last couple of centuries have rejected that base, but a large number and percentage of the masses continue to validate their norms through the broader base.

The third type of proposition in this theory are the types of dilemmas that frequently develop in the application of the empirical and the normative principles. Incorporating these dilemmas into an instructional theory is not customary, so rest of the discourse prior to outlining the theory will be devoted to justifying the incorporation of the dilemmas in the theory.

Teachers or instructional designers who apply principles or purposes to solve the problems they face frequently encounter situations where one principle or purpose is in conflict with another principle or purpose. To solve their problem they have to resolve the dilemma of which principle or purpose should apply in the particular situation. An example will help the reader perceive the pervasiveness of these dilemmas in solving practical problems.

Most teachers subscribe to the principle that an orderly class contributes to the efficiency of learning. The same teachers subscribe to the principle that emotional intensity or interest in a subject increases the efficiency of the learning effort. Intense learners are frequently very noisy and active so they contribute to the disorder of the class. The effective teacher has to resolve this dilemma at some point between the chaos of thirty excited participants doing laboratory work and the more orderly teacher demonstration of the same lab work. The resolution will vary

from teacher to teacher and from circumstance to circumstance, but nobody who teaches avoids deciding or resolving the dilemma.

Resolving dilemmas is not peculiar to the teaching profession. It occurs in every occupation, profession or way of life and in every culture. The terms of the dilemma may vary from culture to culture because some principles of living are culture specific, but all cultures or communities have rules by which people live and the existence of more than one rule guarantees that the citizens in that community will have to resolve dilemmas. Families, tribes, states, nations, professional communities, scientific communities etc. exist and all of them have moral rules, laws, professional standards or scientific standards by which they live. If it were not so, the families, tribes, communities etc. would disintegrate. Every set of moral or professional standards (the Laws of Hammurabi, the Laws of Moses, the Idealism of Plato, the scientific standards of physicists) includes rules, but conflicts always occur in the application of those rules. The Hebrews and the Greeks recognized and accommodated the conflicts inherent in following their rules by making dilemma resolution a part of their basic view of life.

The Hebrews uses the Book of Genesis to explain life and its purpose and one important purpose that God attributes to "man is become one of us, to know good from evil...(Genesis: 4:22) The first moral choice Adam had to make was to decide whether to avoid taking the forbidden fruit or be fruitful, multiply and replenish the earth. Under the circumstances, he couldn't do both. Based on the experience Adam and Eve had in resolving the dilemma between partaking of the forbidden fruit and multiplying and replenishing the earth, it is possible to infer that they had modeled a resolution of a moral dilemma and in the process taught their off-spring that resolving the moral dilemmas inherent to life is a path by which all men learn to know good

from evil. The Greeks acquired their perspective on the importance of resolving dilemmas through philosophical discourse rather than conversations with God. Plato proposed that Philosopher Rulers were the only rulers wise enough to handle affairs of state where the dilemmas between the practical realities of the world were in conflict with the desired ideals. (Plato, 1955) Plato realized that paradox (dilemma) between the desired ideal and practical realities was complex and hard to resolve, so he advocated that the wisest men in the land (Philosopher Rulers) be responsible for resolving such dilemmas.

The Greeks had a sustained impact on Western Civilization through the Hellenization of Rome and the expansion of Rome into a World Empire and the Hebrews had a sustained impact on Western Civilization through the Roman adoption of Christianity as a state religion, so the dilemma or paradox notion has continued in religious and philosophical communities through the ages. Parker Palmer, a modern Christian and a sociologist trained at the University of California expands the theme of resolving dilemmas as a path of Christian progress by suggesting that instead of the contradictions in life being an impediment to spirituality they are an integral part of it. Palmer argues that by making the tensions created by the contradictions or paradoxes the center of our lives we open our selves to a higher spiritual syntheses. He even uses the crucifiction cross as a symbol of this process. The structure of the cross "suggests the oppositions of life - left and right, up and down" thus we are pulled right and left on the horizontal plane and up and down on the vertical plane as we struggle to resolve the tensions of life. The cross further symbolizes that the pain of the paradox is absorbed by the way of the cross and by the redeeming love of Christ. (Palmer, 1980)

Religious communities are not the only modern communities to perceive the central role in dilemma resolution in life or in theory development. Both the philosophical and scientific communities recognize the role of dilemma resolution, resolution of paradox, or dialectical discussion in accurately portraying or explaining phenomena. An early twentieth century philosopher (Cassirer, 1953) and a late twentieth century science reporter (Gleick, 1988) provide arguments that modern philosophers and scientists continue to rely on dilemma resolution to explain the phenomena that theory is expected to explain.

Ernst Cassirer in his Essay on Man traces the contradictions in man's quest for theories to explain biology, mathematics, physics, language etc. He contends that all the break throughs in theory development occurred after the theorists found ways to incorporate the dilemmas in the theory or they delineated the discipline so it excluded the phenomena that precipitated the dilemma. (Cassirer, 1953) The theories based on narrowly delineated phenomena tend to have a shorter span of acceptability and utility, so the preferable theory is more comprehensive in the scope of its explanation. (Gleick, 1988) Gleick elaborated the stultifying effects of narrow theories or disciplines via examples of productive scholars who went for years without a proper hearing because they chose to research and try to explain phenomena that the conventional theories had excluded. Gleick doesn't use the word dilemma or any of its synonyms in tracing the history of the making of new science or theories, but his examples are clear instances of phenomena being avoided because of the dilemma they pose to popular theories of the day. Irregularities in the oscillations of pendulums, random behavior in ecology, demography and economics that stretches the models used to explain them, inconsistencies in commodity prices compared to the conventional wisdom explaining the prices, the infinitely complex geometry of

nature, and the chaotic turbulence involved in fluid dynamics (Gleick, 1988) were all phenomena that biologists, economists, demographers, and physicists avoided because their theories didn't explain them, so rather than struggle with the dilemma of why their theories weren't sufficiently encompassing, they pursued the path of less resistance by refining their theories in terms of the data that supported their theories.

Scientists and philosophers of science have not been the only scholars to recognize the importance of dilemma resolution in explaining phenomena. Leslie Norris, a poet of international renown, gave a "Distinguished Faculty Lecture" (BYU, 1991) which he titled "Without Contraries is no Progression". The central message of his lecture was that good poetry portrays the contrary demands of life and the person progresses by resolving the conflict. Norris illustrated the message by quoting the poetry of William Blake, Samuel Coleridge, John Keats, Wendell Berry, Dylan Thomas and himself. As Norris quoted the poetry to make his point he also made it quite clear that he considered the principle applicable to life's problems rather than simply a standard against which to measure good poetry. Using the contraries in life to progress is a poetic version of the dilemma resolution being suggested as valid theoretical base for understanding and explaining instructional theory.

Ann and Harold Berlak encountered a problem in their educational research that they considered resolved when they used the dilemma resolution notion to solve the problem. The Berlaks went to England to study the British Infant School movement. They were excited with the British movement because it seemed to combine many of their more treasured purposes in schooling and also achieved rather striking results in terms of student learning.

They went to study the British Infant Schools in the early seventies. The U.S. school reforms of Head Start and Follow Through were at their peak of popularity in that period and the rhetoric describing the British Infant Schools had such an appealing combination of claims for mastery of basic skills, facilitation of self-motivated learning, freedom of choice, and informal education that the Berlaks went to England to study program that part of the U.S. Follow Through Schools had attempted to model. After six months of careful observation of nineteen schools, they began to question their observations because they were not seeing what they expected to see. Their expectations had been formed by the advocacy literature that attracted them to come to England, but what they were seeing was not consistent with the literature. They asked their consultants if they had selected the wrong schools to observe and arranged to visit six more schools that had reputations as model schools. Again they found schools that were similar to the original selection. They finally decided "they had been misled by the images of freedom and self-motivation in the open and informal education literature." (Berlak, 1981) They did find "openness" and "informality" portrayed in the schools they observed, but they also found subtle forms of directness and strong intervention by teachers and by the broad social context of community, so the British versions of the open school were more directive and controlled than their U.S. Follow Through counterparts.

The Berlak' analysis of the British and U.S. versions of the open primary school helped to explain the difference in the results between British and the U.S., but for the Berlaks, it precipitated their quest for a descriptive language that would enable a more accurate portrayal of the differences between schools. Ultimately their quest led them to the dilemma language. Using sixteen dilemmas, they felt they could adequately differentiate between the British and the

U.S. School and thereby account for the differences in the consequences of the schools. Having a language that facilitates a clear delineation between schools in terms of their effectiveness at achieving differing goals is important in theory development, (Nagel, 1961) For this reason, the Berlak dilemmas were incorporated in this theory.

This theory consists of the dilemmas inherent to schooling, some principles of teaching and learning derived from psychology, sociology, biology, logic and some conventional wisdom of skilled teachers. All of the principles and dilemmas will be stated as abstractly as possible to reduce verbiage and will be in outline form. The empirical principles will be listed first, but they will be mixed with normative principles printed in italics. The common dilemmas inherent to schooling will complete the outline, and since all dilemmas involve values, norms or ethical rules, they are printed in italics. Following the outline, the theory will conclude with sufficient expansion and explanation of the principles to hopefully make them meaningful to readers. Since some of the scientific principles are speculative in their validity, each explanation of a principle will conclude with a commentary about the quantity and quality of the data available to validate the principle.

AN OUTLINE OF AN INSTRUCTIONAL THEORY

I. Empirical and Normative Principles that Effect Learning.

A. Biological.

1. Human behavior is purposive. (Restak, 1979)
2. Purposes vary in stability and direction. (Restak, 1979)
3. Purposes dispose learners to select and repeat experiences. (Restak, 1979)
4. The theory dilemma between purposive learning and operant learning is an artifact of the behaviorist rejection of internal mental states.
5. The human brain is a pattern detecting organism. (Hart, 1983)
6. The human brain creates mental maps via pattern detecting and via learning the mental maps other have created. (Hart, 1983; Restak, 1979)
7. The mental maps humans acquire affect their learning rate and their learning efficiency.(Ellis, 1978; Higbee, 1977)
8. Mental maps facilitate the transfer of memory items from short term memory to long term memory. (Ellis, 1978; Higbee, 1977)

B. Sociological principles that affect learning.

1. Humans are raised in communities and tend to develop purposes that are consistent with the values of the community. (Homans, 1950)
2. Communities in cultural transition provide an ambiguous value base; consequently humans raised in such communities tend to develop ambiguous purposes and values and the stress between parents and children increases. (Glenn, 1989)

3. *Humans are expected to become responsible for their purposes as they mature.* (Jefferson, 1786)
4. The more knowledge (mental maps) a learner acquires, the more the learner is equipped to make decisions and function as a citizen of the world and its numerous communities. (Jefferson, 1786)
5. The more knowledge a learner has, the more responsibility he is able to assume for the values and the life style chosen. (Carnegie Forum, 1986; USDE, 1991)
6. The capacity of the human for attending, perceiving and retrieving information is consistent with the human developmental stages in any particular culture.

C. Psychological and logical principles that affect learning.

1. Motivational principles that affect learning.

a. Modeling.

1. Learners aspire to be similar to significant others. When teachers are significant others, the learning behavior they model maximizes motivation when they are: (Harmon, 1983)

a. Active, persistent, life-long learners who are interested in everything in the world.

b. Honest, open and receptive to all information, feedback or consequences that infer correction, change of direction or repentance to the learner.

2. Learners who learn in a loving, supportive environment will develop healthy motives that are consistent with the dominant values of their community. (Matthew, 1611)
3. Clear artful communication enhances the incentive for learning. (Donahue & Wessells, 1980; Gerhardie, 1991; Johnson, 1991)
4. Educators who lack emotional control in stress situations tend to have negative impact as models for motivating learning. (Harmon, 1991)

b. Stimulating.

1. Learning incentive can be increased by the following associations:
   a. High congruity between practice and evaluation. (Bloom, 1976)
   b. High congruity between entry and goal behavior. (Bloom, 1976)
   c. Perceived utility of goal behavior. (Bandura & Walters, 1963; Miller & Dollard, 1941; Mowrer, 1950) The learners ability to perceive the connection between what is being learned and what he finds useful is a function of the following:
      1. The dramatic quality and intensity of the presentation.
      2. The plausibility of the connection to the experience of the learner.
   d. Social or material incentives for learning effort. (Skinner, 1953)
   e. Pairing pleasant events with learning activities or learning effort. (Pavlov, 1927)
2. Motivation for learning can be increased by:

a. Attributing culturally acceptable motives to learners for their behavior and their effort to learn. (Harmon, 1992)

b. Teachers having high, realistic expectations for learners. (Good & Brophy, 1978)

c. Teachers progressively adjusting expectations so learners experience early success, but are gradually introduced to higher performance standards. (Good & Brophy, 1978)

3. Motivation for learning can be increased by learner understanding choice and commitment. Learner understands:

   a. Internal locus of control, accountability, choice, self-direction, freedom and consequences. (de Charms, 1976)

   b. Commitment and chooses to learn.(de Charms, 1976)

   c. That the difficulties associated with incorrect anticipation of consequences do not reflect on the value of being a chooser. (Warner, 1982)

   d. The ways to avoid self-deception or rationalization in maintaining a commitment to be self-directed. (Warner, 1982)

4. The motivation for learning can be increased by learning in an orderly, supportive, cooperative classroom where each learner is supported in all his efforts and accomplishments. (Good & Brophy, 1978; Johnson & Johnson, 1985; Senge, 1990) Participants in a learning community have:

   a. Capacity for systems thinking.

b. Personal mastery of skills relevant to the goals of learning.

c. An awareness of their mental models.

d. Shared vision.

e. Willingness to participate in team learning.

2. Instructional principles that affect learning.

a. Planning.

1. The efficiency of planning is increased by long range planning that includes:

a. Provision for the increases in the performance standard as the learner progresses. (Good & Brophy, 1978)

b. *Comprehensive goals consistent with the purposes of the learner and the society.* (Jefferson, 1786)

c. Advance organizers (mental maps) that provide coherence, a linguistic framework and direction for daily plans. (Thorndike, 1984; Walberg, 1986)

2. The efficiency, quality and scope of learning is increased by detailed plans that enable the teacher to:

a. To facilitate "map" (Caine & Caine 1991) learning as opposed to "route" learning.

1. Locale memory = Problem posed - Thematic study - Interdisciplinary quests - Multidisciplinary - Evaluation. (Caine & Caine, 1991)

2. Concepts = Multiple expectations - Curiosity provoking problems- Orchestrated immersion - Multidisciplinary approach - Relaxed alertness - Active processing - Evaluation. (Caine & Caine 1991)
3. Habits = Definition - Context for implementation - Guided practice Independent practice - Evaluation (Young, 1988)
4. Attitude = Energize paired with associations - Recognize paired with associations - Corrections paired with associations via attributing good motives - Evaluation paired with associations. (Harris, 1983)

b. To develop plans that facilitate "route" learning by analyzing the teaching/learning situation in terms of (1) the structure of knowledge to be developed and the objective to be achieved, (2) the ways to faultlessly communicate, and (3) the behavioral responses of the learner so plans can be developed that reduce the chance for failure due to poor teacher communication and optimize learning efficiency and effectiveness. of instruction.
   1. Taxon memory item = Item - Timed practice - Spaced practice - Evaluation. (Gagne', 1982)
   2. Concept
      a. Direct instruction = Definition - Example/nonexample - Practice - Evaluation. (Gagne', 1982; Rosenshine & Stevens, 1986)

b. Indirect instruction = Example/nonexample - Definition - Practice - Evaluation. (Bruner, 1960)

3. Habit = Definition - Context for implementation - Guided practice -Independent practice - Evaluation. (Young, 1988)

4. Skill = Model - Guided practice - Independent practice - Evaluation. (Gagne',1982)

4. Attitude = Energize paired with associations - Recognize paired with associations - Corrections paired with associations - Evaluation paired with associations. (Harris, 1983)

c. Use of learning principles.

1. High learner response rate. (Rosenshine & Stevens, 1986)

2. Motive supported feedback. (Rosenshine et al, 1986)

3. Sufficient practice for over - learning. (Rosenshine et al, 1986)

4. Modeling. (Bandura, 1971)

5. Memory principles:

a. Meaningful material easier. (Ebbinghaus, 1903; Higbee,1977)

b. Patterned or organized material easier. (Ellis, 1978; Higbee,1977)

c. Feedback facilitates.(Ellis, 1978; Higbee, 1977)

d. Repetition facilitates. (Ellis, 1978; Higbee, 1977)

e. Recitation facilitates.(Ellis, 1978; Higbee,1977)

f. Interference reduces and is enhanced by:

1. Underlearning. (Ellis, 1978; Higbee, 1977)
2. Distracting activities.(Ellis, 1978; Higbee,1977)
3. Learning similar things in a short time.(Ellis, 1978; Higbee,1977)
4. Learning context different than application situations.(Ellis, 1978; Higbee, 1977)

c. Provide multisensory perceptions to broaden the semantic connection between the symbol and reality. (Rosenshine et al, 1986)

e. Arrange systematic variation of the instructional setting to enhance transfer. (Cormier & Hagman, 1987; Ellis, 1978)

3. The efficiency of learning is increased by frequent evaluations congruent with practice. (Rosenshine et al, 1986)
4. The efficiency of learning is increased by using evaluation data to reflect on the results and adjust subsequent instruction. (Rosenshine et al, 1986)

b. Implementing.

1. The efficiency of learning is increased by effective use of time.
   a. Transitions. (Rosenshine et al, 1986)
   b. Pace. (Brophy & Good, 1986)
2. The efficiency of learning is increased by consistently:
   a. Allowing students meet their own expectations and orchestrating total immersion, relaxed alertness and active processing when map learning plans are being implemented. (Caine & Caine, 1991)

b. Holding students accountable for purposes when route learning is being implemented. (Good & Brophy, 1978)

c. Supporting class behavior standards. (Brophy & Good, 1986)

d. Using learning principles. (Brophy & Good, 1986)

3. The efficiency of learning is increased by persistence at tasks that require sustained effort. (Brophy & Good, 1986)

4. The efficiency of learning is increased by attending to students: Withitness. (Good & Brophy, 1978; Kounin, 1977)

II. Dilemmas Inherent in Applying a Set of Instructional Principles.

A. Control Set.

1. *Whole child vs the child as a student.*

2. *Teacher vs child control (time operations, standards).*

3. *Social control vs individual justice.*

4. *Order vs intensity.*

B. Curriculum Set.

1. *Personal knowledge vs public knowledge.*

2. *Knowledge as content vs knowledge as process.*

3. *Knowledge as given vs knowledge as problematical.*

4. *Learning is holistic vs learning is molecular.*

5. *Intrinsic vs extrinsic motivation.*

6. *Each child unique vs children have shared characteristics.*

7. *Learning is individual vs learning is social.*

8. *Child as a person vs child as a client.*

C. Societal Set.

1. *Childhood continuous vs childhood unique.*
2. *Equal allocation of resources vs differential allocation.*
3. *Equal justice under law vs ad hoc application of rules.*
4. *Common culture vs sub-group consciousness.* (Berlak, 1981)

ELABORATION OF PRINCIPLES THAT AFFECT LEARNING AND INSTRUCTION.

(I.A.) Biological: Biologists study plants and animals. Humans are animals, so biologists can makes generalizations about humans that provide useful information about learning and teaching. The following biological generalizations were selected because they affect learning and teaching of humans.

(I.A.1.) Stating that humans exhibit purposive behavior may seem trite to readers, but the fact that some behaviorist psychologists have discounted the purposive behavior requires that it be said. Almost all school curriculum is justified in terms of a purpose and purposive behavior infers a natural motivation to learn, so it is useful to repeat this biological generalization as a part of this instructional theory. The fact that this generalization seems trite verifies that people tend accept it as valid but public acceptability is not a sufficient standard of validity in the scientific community. The scientist making this assertion is a biologist summarizing the research on the brain. Most research involving the brain comes from the medical community or from animal research and has a strong empirical base, so the validity of the principle is less questionable than the behaviorist's assertion that learner purpose is an unverifiable internal mental state. (Restak, 1979)

(I.A.2.) Purposes vary in stability and direction. This biological generalization is stated because it is a condition that affects the predictability of learning. Scientific theories have to represent reality even if it is an uncomfortable reality. The variations in human purpose make learning guarantees problematical. Teachers and teacher's clients need to realize this in establishing realistic expectations. A teachers expectation for a learner will have some motivational impact, but it will have more if the learner's purpose corresponds to the teacher's expectation. The validity of this principle is based again on animal and medical research where a great deal of research has been done in the last twenty years. The title of Restak's book, The Brain: the Last Frontier, infers that brain research will continue to provide important clues about learning and instruction for years to come so keep tuned for further developments.

(I.A.3.) Purposes dispose learners to select and repeat experiences. Since teachers expect learners to repeat experiences, then it is useful to be reminded that a learner with a purpose will learn with more direction with or without other incentives. The validity of this principle is directly related to the research cited in the two previous examples, so the sources will not be cited again.

(I.A.4.) The dilemma between purposive learning and operant learning is an artifact of behaviorist philosophy rather than scientific findings. Purposive learning and operant learning can be the same if the reader recognizes that operant learning is reinforced by consequences which makes it possible for a learner to choose the consequences he desires by his purposes. The validity of this principle is a logical extension of the fact that consequences reinforce or diminish operant behavior; consequently the behavor always has the option of deciding whether the consequences of his actions will be considered rewards or punishments. Some learners go with

the flow and appear to controlled by the consequences of their behavior. Others clearly choose consequences that appear to be a deterrent to the behavior because they have a higher purpose that over rides pleasure seeking tendencies.

(I.A.5.) The human brain is a pattern detecting organism. All language acquisition depends on the learner eventually recognizing that symbols are used to represent classes of phenomena and classes of phenomena is another phrase for a pattern. When a young learner can finally make the connection between a pattern and the word used to label the pattern he has learned that concept. Obviously this biological phenomena is useful to a teacher since one of his goals is to enable learners to recognize and correctly label certain patterns. This principle is a logical extension of brain research so its validity has an empirical base in biological research and a logical base in communication theory. (Hart, 1983; Restak, 1979)

(I.A.6.) The human brain creates mental maps via pattern detecting and via the maps other have created. This generalization is a logical extension of the pattern detecting generalization and its utility may be obvious, but it is too important to be left un said. The validity of this principle is tied to all of the research on pattern detecting. (Hart, 1983; Restak, 1979)

(I.A.7.) Mental maps facilitate the rate of learning. The more learners know, the more resources they can use in learning new material especially if their mental maps are organized for efficient retrieval. Most sophisticated scientific theories have gone through such a thorough process of peer review that they are useful mental maps for learners. The validity of this principle is partly tied to the research on the effect of entry behavior on subsequent learning and partly tied to simplicity of the retrieval system for using the map when learning new information. The more elegant and simple the map, the easier it is to retrieve and learning new

and related material. Entry behavior, clear communication and information retrieval are all independent variables in the learning equation that have effected learning rates. (Bloom, 1976); (Hart 1983; Higbee, 1977; Restak, 1979; Walberg, 1986)

(I.A.8.) Mental maps facilitate the transfer of memory items from short term memory to long term memory. The more elegant or simple the map (theory), the easier the effort in moving from short to long term memory. Well organized mental maps also facilitate the ease of retrieval. This principle is a logical extension of the (I.A.7.), but most of the research directly pertaining comes from the memory research. (Ellis, 1978; Higbee, 1977)

(I.B.) Sociological principles are generalizations about human behavior that are based on systematic observation of social behavior. Sociological generalizations include observations about the values of humans so it is harder to be and portray scientific objectivity in the wording of the principles.

(I.B.1.) Humans are raised in communities and tend to develop purposes that are consistent with the values of the community. This sociological/ anthropological conclusion is so cautiously stated that it is easily accepted and hard to disprove; however it is a useful conclusion to an instructional theory, since value development is an important phenomena to be explained by any instructional theory. The problem educators face in value development comes from the fact that one school can serve several communities and the values of those communities can be and are frequently in conflict. Humans raised in such a context have a hard time developing the values their parents wish, because neighboring communities offer attractive alternatives that interfere with the value acquisition process. Value clarification activities were designed to help students face this problem, but the value clarification process subtly incorporates the norms of the school

community, so parents may still be legitimately concerned about how the schools are resolving the value development dilemma. Homans, 1976 was one of the early researchers to document the effects of a community on its members. (Homans, 1950) Subsequent research has verified Homans conclusions.

(I.B.2.) Communities in cultural transition provide an ambiguous value base; consequently humans raised in such communities tend to develop ambiguous purposes and values and the stress between generations increases. The rapid change in much of our culture following World War II has be cited as an example and the learning consequences of that change began to be apparent in the late sixties when ACT scores began to decline and revolutionary youth groups began to develop. The validity of this principle is partly anecdotal and partly hard data and much of it is reported by Glenn. (Glenn, 1989)

(I.B.3.) Humans are expected to become responsible for their purposes as they mature. The abstract of the theory acknowledged that this was a moral statement rather than a scientific principle. The assumption in this statement was that most educators and parents would concur; consequently it satisfied the consensus criteria for the normative part of the theory. It probably satisfies most religious groups so it has consensus validity with the masses and the elite. (Jefferson, 1786)

(I.B.4.) The more knowledge (mental maps) a learner acquires, the more the learner can be aware of the choices he makes and the values he develops and the increased knowledge increases the number of sub-groups where the learner can function comfortably. This conclusion of cognitive psychology has the ring of scientific replicability, but values are inherently hard to measure, so it would be hard to replicate research that confirms the conclusion. (Jefferson, 1786)

(I.B.5.) The more knowledge a learner has, the more responsibility he has to assume for the values and life style he chooses. This is another value statement, so the assumption in making it is that most educators would agree to it. Part of the purpose in sharing this theory will be to confirm or dispel the value positions built in to it so the author welcomes reports which agree or disagree with the values built into the theory. (Carnegie Forum, 1986; USDE, 1991)

(I.B.6.) The capacity of the human for attending, perceiving and retrieving information is consistent with the developmental stages of the humans in any particular culture. This statement was included to acknowledge the role that maturation and culture has in explaining and limiting the kind and quality of growth for various aged learners. Piaget, Erikson and Gesell are some researchers who have elaborated the developmental stages. This principle recognizes the value of that research and the author assumes teachers know that research to maximize their effectiveness as teachers.

(I.C.) Psychological and logical principles that affect learning and instructing: The Psychological principles are verified by empirical research. Logical principles are verified by logical deduction from some logical axiom or some value statement that is verified by consensus.

(I.C.1.) Motivational principles are psychological or logical principles that explain or account for human motivation. The word motivation was purposely chosen because it concedes the possibility of internal mental states. By choosing to use the word motivation, the author also concedes the enormous burden involved in empirically validating so called scientific principles, when motives are so difficult to measure. Validating principles that identify motive variables in a learning equation creates a big difficulty, but not as big as the practitioner faces if he is denied the validity of the concept of motivation in planning and implementing instruction.

(I.C.1.a.) Modeling is what a teacher or a person does that sets an example for learner. Modeling for motivation implies that the model is interested is the subject being taught. Since interest implies learning, the model is also knowledgeable about the subject. Teachers as models have complex roles because even teachers who have narrow specialties such as medieval history or organic chemistry are also expected to be capable writers or clear articulators of their field of expertise. The empirical validity of all principles of motivation relating modeling to motivation rests primarily on the conventional wisdom of experienced practitioners. Including the word motivation in the equation automatically tells the reader that these principles rely primarily on conventional wisdom. Rigorous researchers have too much difficulty with the concept of motivation to take on that kind of research. Practitioners, however have to solve problems and the concept of motivation is one of their key tools, so a conventional wisdom develops among successful practitioners that modeling does have a role in motivating learners.

(I.C.1.a.1.) Learners aspire to be similar to significant others. Significant others can include close friends, family, admired leaders, fellow team members, popular idols and respected heros. Psychologists have not researched this principle because of the difficulty of measuring motive, but few people question the validity of the conclusion. When teachers are the significant others, the learning behavior they model maximizes motivation to learn when they are:

(I.C.1.a.1.a.) Active persistent, life-long learners who are interested in everything in the world. Particularly elementary school teachers are responsible for a curriculum that encompasses all that is known about the world, so the teacher's interest in that world affects the learning climate of his or her students. Teacher disinterest in history, mathematics, writing, art etc will tend to undermine learner interest and motivation to learn those subjects. Effective elementary

teachers are life long learners of all that man has learned. It is easy to spot a retired elementary teacher in a museum. They read or listen more carefully to the narrative, they linger longer at the exhibit, they collect materials and printed materials even though they no longer have students to whom they will return in the Fall. Teachers who become this way are assumed to have a motivational impact on their students. The word "assumed" was intentional to convey the problem of validity with this principle. When "motivation" was chosen as an independent variable in the learning equation, all of the principles identified had to be acknowledged as speculative. Motivation is so hard to measure, researchers tend to avoid using it has an independent variable in the learning equation.

(I.C.1.a.1.b.) Honest, open and receptive to all information, feedback or consequences that infer correction, change of direction or repentance for them as learners. Learners who can not accept correction, negative feedback or consequences that infer a change of procedure are doomed to plateau in the learning in which they are engaged and in some instances to regress in their learning. For teachers with this tendency, the consequences are compounded because they tend to plateau in their learning but they also plateau in what they learn about teaching. Effective teachers got that way by learning from their mistakes and if they tend to avoid facing their failings, then they tend to be self-deceptive and rationalizing to avoid perceiving the consequences in their lives that tell them to change. Their tendency to plateau as learners and their tendency to not face the reality about the effects of their teaching compound to reduce motivation to learn in their learners. Conventional wisdom of educators supports this principle, but not hard research. Hard research tends to avoid the motivation variable.

(I.C.1.a.2.) Learners who learn in a supportive environment will develop motives that are consistent with the dominant values of the community. Class rooms are embryo communities and as communities they have to have standards of behavior. The enforcement of the standards of behavior can range from punitive and harsh to warm and supportive. A warm and supportive environment enables learners to have positive associations with the community so they can positively identify with the norms of the community. In contrast, a community that uses harsh enforcement procedures enables learners to have negative associations with the community so they can negatively identify with the norms of the community. The older the learners the more peer relationships affect the community so teachers need to have skills that influence the peer community to facilitate a community that provides a supportive environment. This principle is based on logical application of classical conditioning. It has not been tested rigorously as a principle, except in the crucible of daily experience by skilled teachers and the kind of research George Homans did in his study of human groups. (Homans, 1950)

(I.C.1.a.3.) Clear, artful communication enhances the motive for learning. Communication can be written, oral, graphic, non-verbal etc and the more artful it is the more power it has to enhances motivation. (Donahue & Wessells, 1980) The humanities repeatedly document the impact of certain artists, musicians, architects, sculptures, poets, dramatists etc. on the morality and preferences of their peers and future generations. (Gerhardie, 1991; Johnson, 1991) The validity of this principle is more evident in the study of history and the arts than it is from psychological research or the conventional wisdom of skilled teachers.

(I.C.1.a.4.) Educators who lack emotional control in stress situations tend to have a negative impact as models for motivating learning. Emotional outbursts or expressions from teachers

produce stress in the learning environment. Stress isn't always bad for the learning environment but when teachers are the source for the stress, it is hazardous to the mental health of those who become the objects of uncontrolled or random emotional expressions. Lack of emotional control infers the person will say or do things he didn't intend to do under certain stress conditions and such stress for children reduces their motive for learning. Child abuse, violence, traumatic events such as floods, earth quakes, tornados, peer pressure, and mob action are examples of events that produce emotional conflict or stress and the severity of the effects of these kinds of events is probably sufficient evidence to even the most rigorous researchers of the validity of this principle. Due to the difficulty of measuring motivation, this principle is inherently hard to validate.

(I.C.1.b.) Stimulating motivation is what is done to the learner from the outside. Some of it is exclusively an exterior event such as a food reinforcer or the pleasant associations of a fun party, but some of it may be outside events that stimulate the learner to alter his inward feeling and commitments. The exterior events that are self-evident incentives are much easier to research than the events that appeal to inward choices and commitments, so the research support for the various principles will vary significantly.

(I.C.1.b.1.a.) Learning incentive can be increased by high congruity between practice and evaluation. For those who have not taken geometry, congruity means similarity, equality or sameness. The principle simply states that if the learner practices what he has to learn for the test, he will perform well on the test so he will feel good about the learning and will be motivated to continue learning. As long as this principle is phrased as learning incentive there is considerable operant research to support it. (Bloom, 1976) As soon as the term incentive is

changed to motivated then the validation of the principle comes from the conventional wisdom of skilled teachers.

(I.C.1.b.1.b.) Learning incentive can be increased by high congruity between entry behavior and behavior to be learned. In other words, if a learner already knows a good deal about what is being taught he will perform well on tests and he will continue to be motivated as a learner of the material. Bloom was the major researcher who pronounced this principle without using the word motivation in the principle and he felt so strongly about the principle that he concluded that lack of entry behavior was the principle reason for failure of most students. (Bloom, 1976) He concluded that if the entry behavior problem were solved all variations in learning rate would disappear. Not everyone would agree that all variations in learning rate would disappear if students could be remediated to correct their entry behavior deficiencies, but most researchers and teachers would agree that correcting entry behavior deficiencies would solve many problems. The durability of the Head Start program reflect this validity statement. The statement loses some of it appeal to researchers when motivation becomes the dependent variable rather than incentive.

(I.C.1.b.1.c.) Learning incentive can be increased by learners perceiving the utility of the instruction. Utility implies that what is being learned has immediate use to the learner or the learner can realize the long range use which he appreciates. Since modern schools start with young learners and keep them in school many years with little opportunity to experience the demands of living or earning a living, much of the curriculum is introduced before learners have a basis to understand the utility of what they are required to learn so their motivation to learn is less. This especially true where the curriculum is broken into small pieces to facilitate simpler

presentations. This principle expects the teacher to devote some time to helping the learner see how they might use what is being learned. It also expects the teacher to spend time integrating fractionated subjects so the learner has some big picture perspective with which to sense the utility of what is being learned. The validity of the principle to practitioners is self-evident. To the researchers, especially the behavioristic researchers, the principle is more speculative. Utility tends to be defined by the perspective of the learner which to the behaviorist becomes hard to research. Utility is a more acceptable variable to the cognitivist, but the utility variable is still hard to measure so research is hard to do. The validity of the principle tends to come more from conventional wisdom than careful, controlled research. (Bandura, 1963; Miller & Dollard, 1941; Mowrer, 1950)

(I.C.1.b.1.c.1.) Learning incentive can be increased by learners perceiving the utility of the goal behavior because of the dramatic quality and intensity of the presentation. This principle is the same as its parent principle except that it adds dramatic quality and intensity to help the learner perceive utility. Dramatic quality and intensity are significant additions to the principle. Theater is a compelling way to facilitate perception of utility and the history of theater documents its motivational impact. Seseme Street is a concrete example for children but there is a good deal of children's theater that has a similar impact and even attracts the interests of the very young. All of us have had enough experience with theater to validate this principle so the conventional wisdom accepts the principle. Hard, empirical research is another matter. This writer know of no controlled research that supports this principle.

(I.C.1.b.1.c.2.) Learning incentive can be increased by learners perceiving the utility of the goal behavior because of the plausibility of the connection between the goal behavior and the

experience of the learner. This principle is a more specific example of the parent principle in the outline so the discussion of its meaning and its validity was handled under the (I.C.1.b.1.c.) principle. It will not be discussed again.

(I.C.1.b.1.d.) Learning incentive can be increased by social and material incentives for the learning effort. Social and material incentives were lumped together as if they mean the same thing. In reality they are different in such important ways that this discussion needs to recognize some problems in the application of this principle. Material incentives are points, food, gimmicks, money, stars etc. Social incentives are comments such as good, well done, excellent, poor performance etc, but they are also comments which help the learner see the social value of the learning which is useful to the learner so this type of consequence give the desired behavior a kind of utility. This distinction is important because critics of material incentives cite research that suggests that material incentives lead to poor motivation in the long term when the incentives cease. Social incentives of the kind that lead to the learner perceiving the utility of the goal behavior might not be so vulnerable to deterioration as incentive as the learner matures. The user of this theory needs to recognize that material and social incentive have different enough long range effects to not lump them together as principles of learning as this theory has done to reduce verbiage. The validity of this principle has been well documented in the behavioristic research. (Skinner, 1953) It is probably true that good teacher or educational program needs to shape the direction incentives take for the long range benefit of the learner, but the research behaviorists were and are highly skilled at shaping and avoiding the long range consequences for which they have been criticized. Most of the difficulties associated with too extensive use of material incentives for too long and too much fractionation of the curriculum

have come from professional use of behavioristic principles without enough training to anticipate the consequences of their adaptation of programs.

(I.C.1.b.1.e.) Learning incentive can be increased by associating or pairing of pleasant events with the learning activities. All of the previous examples of associations are derived from behavioristic psychology where all behavior is classed as operant behavior. The last one (e) is an application of a principle of classical behavior, (Pavlov, 1927) but since operant behavior is always paired with some kind of emotional or classical behavior, then a good teacher recognizes the potential for classical behavioral change in all instructional situations. Learning success stimulates positive feeling. Learning failure stimulates negative feelings. The first two principles (a & b) facilitate successful learning. Principles (c) and (d) increase the incentive to learn. If increased effort enables the learner to learn, then the incentive will produce the desired result. If the targeted learning is so beyond the learner's capacity, that increased effort will not help, then incentives will not work as desired. All of these principles are backed by considerable research as long as the variables are measurable. When motive is the variable, there is a dearth of research to support these principles. Then the justification of the principles comes primarily from the conventional wisdom of effective teachers. Pavlov deserves the credit for discovering the associative effect of pairing a stimulus such as doing school work of different sorts with and emotional event such as pleasure or displeasure so that the stimulus event such as school work begins to produce the emotion with no other emotion producing stimulus. Obviously this principle can work both positively and negatively so teachers need to do a good deal of observing and reflecting to be sure they get the desired effect.

(I.C.1.b.2.a.) Motivation for learning can be increased by attributing culturally acceptable motives to learners for their behavior and their learning efforts. Daily dialogue between teachers and students includes comments in which the teachers attribute motives to the students for their behavior. For example when a teacher says to a student, "this is the third day in a row you haven't finished your assignments. You need to get over being angry over not being first in line last Monday and get back to being a student." he assumes a motive for the failure to do assignments that may not be close to the real reason and if the student perceives the assumption of motive to be quite negative then the students feelings towards the teacher may be anger and the desire to retaliate. If the teacher continues to attribute negative motives to the student's behavior then the student's desire to retaliate increases and refusal to do assignments or cooperate with the teacher is a typical form of retaliation. The end result is that the student's efforts to learn becomes a tool of retaliation. Attributing negative motives to others for the behavior that bothers us is a common cultural phenomenon. It is an effective punishing device used by most everyone. When we are angry with some one we bolster our anger by attributing intentional harm to their behavior. This happens so frequently that very young children learn quickly to assert intention to playmates who injure or offend them. Assuming negative motives for other's behavior assures that the conflict between the parties will increase and both sides will resist efforts at reconciliation. The effects of positive motive attributions on relationships between people are harder to visualize because they occur less frequently, but when they do the cooperation and good feelings between the parties are enhanced. When teachers credit students with the best motives that make sense for all behavior, the student enjoys the association and tries to justify the teacher's perception so desired behavior increases and the associative principle

begins to affect the students motives for learning. The teachers who I have observed using this principle consistently have a dramatic positive effect on their student's desire to learn what is being taught. The teacher who originally taught me the principle was so consistent that in ten years of observing him teach I saw everyone of the four hundred students he had during that time were trying hard to learn and do as they were expected as fourth grade students in a public school. The validity of this principle is based on anecdotal observations, a logical analysis of the way people interact with each other and my personal experience. No one has conducted controlled research and controlled research would be very hard to conduct because of the difficulty of measuring motivation to learn.

(I.C.1.b.2.b.) Motivation for learning can be increased by teachers having high, realistic expectations for learners. The words "high" and "realistic" are equally important to this principle. If the teachers have high but unrealistic expectation for the learners, many of the learners will soon give up and quit trying to learn. If the teachers have realistic expectations but not particularly high ones, then most of the students will meet the expectations but they will not learn as much so their motive to learn will not change. The validity of the principle is limited to anecdotal evidence as long as the word "motive" is the dependent variable. Had I used the word "incentive" for the dependent variable, the validity evidence is abundant in the research literature. (Good & Brophy, 1978)

(I.C.1.b.2.c.) Motivation for learning can be increased by teachers progressively adjusting expectations so learners experience early success, but are gradually introduced to higher standards. (Good & Brophy, 1978) This principle is an artifact of the principle just discussed and the fact that standards of performance on any learning objective are always much higher than

realistic standards for beginning learners permit. Standards of performance for learning in modern society are so high that few learners reach the ultimate standards and even those who do who earn a living by their performance have coaches who continually help them see where they are slipping. Concert pianists, Olympic athletes, world class scholars and top level industrialists all use coaches, peers and consultants to help them maintain their standards of performance, so this principle is a natural sequel to the principle preceding it. For this reason, its validity is based on the same data and research. Unfortunately the guided practice implied by this principle is labor intensive so the super stars and the super successful get more than their share of learning support as the expectations increase.

(I.C.1.b.3.a.) Motivation for learning can be increased by the learner's choice. The teacher needs to understand "internal locus of control", "accountability", "choice", "self-direction", "agency', "freedom and consequences" so he or she can teach them to his or her students. An independent, self-motivated learner has to understand concepts such as accountability, choice, agency, self-direction and consequences to make good choices and be willing to take the consequences of his or her actions. Having learners be responsible for their own motives to learn is an ultimate goal for all learners and teachers but it is a hard goal to achieve. Its hardness to achieve is partly related to the lack of research on the topic and partly related to the fact that taking responsibility for poor choices can be painful to the learner so learners resist being responsible when the begin to face the negative consequences of their actions. (Fromm, 1941) The remainder of the principles listed under this principle were relevant to the difficulties of counseling learners so they will persist in assuming personal responsibility for their own motivation to learn. The validity of this principle has had some research support since cognitive

psychology became more acceptable, but the data supporting the principle is not massive even when terms such as "internal locus of control" and "incentive" are the variables of research. (de Charms, 1976)

(I.C.1.b.3.b.) Motivation to learn can be increased by learner choice and he commits to learn. A learner can choose to have the goal of being an independent learner especially if he understand the concept of commitment. Choices will invariably be made where the consequences are not anticipated and not desired. Having commitment enables the learner to endure non-desired consequences while continuing to accept responsibility for subsequent choices. The younger the learner the less persistence he will have when facing undesired consequences so the teacher needs other tools to help counsel learners through the trials of bad choices. The validity of this principle is based on my personal experience and the logic associated with choices and accountability. I know of no research that validates the principle.

(I.C.1.b.3.c.) Motivation to learn can be increased by learner choice and the learner can be helped to endure uncomfortable consequences and persist with his independent stance if he is counseled and helped by his peers, teachers and parents at appropriate times. The teacher's role in helping learners deal with such consequences is to help the learner anticipate such consequences and think through rational ways to live with the consequences without giving up the prerogative of being an agent learner. The timing of the counsel is particularly important but so is the motive support since young learners frequently are antagonized by dire warnings of consequences. The validity of this principle is based on my experience. I know of no research that supports the principle as logical as it sounds.

(I.C.1.b.3.d.) Motivation to learn can be increased by learner choice and the learner can be helped to endure the uncomfortable consequences and persist with her independence if she is taught ways to avoid self-deception or rationalization in maintaining commitment to be self-directed. Since many learner choices have a moral connotation to them, self deception or rationalization is a common escape mechanism frequently used to avoid taking responsibility for actions, so teachers serve as counselors in helping learners work through such problems. The research evidence in support of this principle is limited to clinical settings where counselors use such concepts to help people adjust to the problems encountered in life. Self-determination and self-direction are acceptable terms in the psychological community, but agency and choice have religious connotations that alienate the some of the scientific community, so they rarely get used. Teaching practitioners are less squeamish about their vocabulary, so they tend to affirm the utility of self-determination and agency as legitimate perspectives from which to motivate learners to learn. (Warner, 1982)

(I.C.1.b.4.) Motivation to learn is enhanced by learning in an orderly environment where all learners enjoy mutual respect for their learning efforts. It is possible to have an orderly environment in which mutual peer respect for individual learning efforts does not exist so each of the parts of this principle need to be discussed. Orderly environments in school classes can be achieved in many ways, but not all of the ways also produce an environment where each learner is respected by all the other learners regardless of the mistakes and characteristics of each individual learner. The combination of an orderly environment and mutual respect is quite difficult to achieve especially as children get older and peer influences tend to be less subject to adult interventions. The Cooperative Learning movement has made great strides in developing

procedures to produce such a class, but the volume of the literature and the number of work shops needed to facilitate teacher proficiency testify to the complex of skills needed to implement such a program. A recent book by a scholar from the business community testifies that this principle has utility in the business world as well as the educational world. (Senge, 1990) This principle is a combination of norms and science. The rules for an orderly environment in which all enjoy respect are normative. The fact that this kind of environment facilitates motivation to learn has the potential of being scientific. The main problem is the word motive. It is hard to measure so it is hard to use as a variable in an equation for predicting learning. The logic is clear. Learners invariable err in the process of learning so how the teacher and the rest of the class treats the error affects the learners attitude toward continued learning. A class atmosphere where one or more students are mistreated because of their errors will reduce learning effort. A class where all learners are respected whether they err or not will enhance the learner's learning effort or his motivation. Anecdotal data and reason confirm this principle, but it will be harder to conduct rigorous research that confirms the principle. Both the cooperative learning movement have considerable anecdotal evidence and some research studies to support the validity of their claims. (Good and Brophy, 1978), (Johnson & Johnson, 1984), (Senge, 1990).

(I.C.1.b.4.a.) Suggesting the participants in a learning community have the capacity for systems thinking is the suggestion of Peter Senge a prominent consultant for big business. The capacity for systems thinking is the capacity to integrate all of the little parts of the system into a big picture view. Since systems and big picture views tend to be abstractions then the participant has to be able to deal with abstract ideas. It is possible to have a learning community of primary grade children where they limited training or capacity for systems thinking as the

"cooperative learning" movement documents, but the older the learners in the community and the more complex the community becomes, the more critical the capacity for systems thinking becomes to maintaining a learning community. Primary grade children tend to be less affected and less involved in the school community than they are with their class but as learners learn and mature, the more they perceive and are influenced by the larger communities. Consequently participants in a larger, more mature learning community need to have the capacity for systems thinking to be able deal with all aspects of the community to maintain a learning community. Learning communities do not happen by accident. They develop as a result of individual and community action. Participants and leaders are critical to the process and functioning learning communities can regress to non-learning communities if either participants or leaders undermine the social equation involving honest reporting of facts and data, mutual concern for all participants, support for those having to deal with corrective feedback, equality of opportunity for all community members and the desire to learn and progress. (Senge, 1990) The validity of this principle is based primarily on Senge's data in working in the business community where all participants are adults. I know of no research on systems thinking as a part of learning organizations based on public school classroooms.

(I.C.1.b.4.b.) The motivation for learning can be increased by learning in an orderly environment where participants have a personal mastery of skills relevant to the goals of learning. The goals of learning vary according to the ages of the learner and so do the skills needed to function in learning groups. First graders are just learning to read and reading is a vital skill to most of the goals of learning groups, so first graders can function as learning groups to a lesser extent than older groups of learners. Senge developed all five of the principles

affecting the participant in a learning community and all of them grew out of his experience in counseling business organizations to be more effective in achieving the goals of business, but all five principles have relevance for any type of community having goals and purposes so the principles have relevance for schools and school systems. Having participants have mastery of the skills relevant to the goals of learning makes immediate sense to educators. The primary goal of elementary schools is to equip young learners with basic skills so they can function more independently in all of the learning communities where they are students or where they are employed. Skills can be developed as participants in a learning community as the "cooperative schools" movement demonstrates, but the more skill the participants have the more effort can be directed toward expanding knowledge achieving the goals of the community. (Senge, 1990) The validity of this principle is based on Senge's work with busienss organizations not public school classrooms so it validity for public schools classroom will have to remain tentative until more research is done.

(I.C.1.b.4.c.) The third principle Senge developed was that all participants in a learning community or organization be aware of mental models. This principle is a variation of the principle involving systems thinking in that it requires maturity and some ability to think abstractly. Young children have to mature and learn to be aware of mental models so this principle operates as a goal for young learners rather than a condition achieved as a learning community. As learners mature, the complexity of life and the communities in which they live increases and the need for awareness of mental models increases. Participants in learning communities need to be not only aware of mental models but they also need to be ware of how mental models are developed so they do not have too much reverence for the models. Models

change with scientific inquiry so participants need to be willing to change when the models are no longer adequate. The validity data for this principle comes from business organizations so its validity for schools will have to remain speculative until more research has been done in applying the principle to schools as learning organizations.

(I.C.1.b.4.d.) The fourth principle suggests participants in learning organization have a shared vision. A vision allows participants to keep the big picture in focus. It enables participants to have perspective when the details and circumstances are confusing. Shared vision enables participants to be engrossed in the detail and day to day encounters without losing sight of where the community or organization is supposed to be headed. Shared vision counteracts some of the negative effects of specialization and prolonged periods of detailed work. This principle sounds good to public school practitioners, but its testing by practitioners has not been published so the its validity has intuitive support from skilled practitioners but remains unverified in the research literature.

(I.C.1.b.4.e.) The fifth principle requires the participants to be willing to participate in team learning. This principle applies to all learning communities. Some of Senge's principles didn't apply to primary grade learners, but this one does. Willingness to participate in team learning may have to be learned by young learners, but it is important. Since willingness to participate in team learning is not automatic for any organization or community, the problem needs to be confronted and solved if the community or organization hopes to be a learning community. The cooperative learning movement works on this principle so there is considerable data from public schools supporting the validity of this principle. (Johnson & Johnson, 1984)

The validity of Senge's five principles underlying successful learning organizations is based on his experience in analyzing successful and unsuccessful business organizations. He contends that only learning organizations survive as successful businesses for very long. Competition in a world market economy is so effective in eliminating businesses that fail to become learning organization that even the big corporations are vulnerable. He cites a number of major corporations that have gone bankrupt because of their failure to become learning organizations and he also cites a number that have grown and become more successful because of their application of the principles just dis[illegible]. This kind of validity research may not have the rigor of controlled, experimental research, but Senge's arguments and data do have significance and sufficient rigor to justify testing them as principles useful to schools.

(I.C.2.) Instructional principles are principles that increase the efficiency of the learning process. Since the efficiency of the learning process also affects a learners attitude toward learning, then the Motivation/Instruction category system overlaps. Due to the Pavlovian concept that any event paired with an emotional response will gradually result in the event stimulating the emotion, it is impossible to create a category system in which attitudes do not overlap some other category. In my judgment, the best that can be done is to acknowledge the problem and proceed with the best organization of principles as possible. Hopefully peer feedback will aid in the refining process.

(I.C.2.a.) Planning assumes purposes and purposes assumes values, so the values implicit in any instruction are a normative element that requires justification. Norms and values are justified in a democratic society by majority vote or consensus. The customary process by which the purposes of public schooling are justified are by Board of Education vote, by curriculum

committees serving the state or district or by needs assessment surveys. All of these processes have a democratic quality so they approximate a valid justification procedure. In religious schools, the justification procedure includes approval by delegated authorities who represent God or the religious community.

(I.C.2.a.1.) The efficiency of learning is increased by long range planning. Teachers who do not plan for long range objectives will not achieve hard to achieve objectives except by accident. Many of the most important objectives for schooling have to be long range objectives because they can't be achieved in one or two days of instruction. In a complicated modern society with complicated cultures and sub-cultures most important objectives of schooling are long range objectives. To compound the problem, the more encompassing the political structure serving the communities, the more extensive the demands and expectations placed on the schools resulting in an over-loaded curriculum. A good deal of scholarly and political rhetoric is devoted to championing particular long range objectives to compete for a central position in the over-crowded curriculum. One of the elements of teacher burn out stems from the impossible expectations communities have for schools. Teachers feeling they aren't doing what they ought to do is debilitating, and when the "oughts" exceed what can be done, the teacher needs to adjust her sense of guilt to fit what can be done rather than to the ambiguity of public pressure. The validity of this principle is based on democratic processes that have already been discussed and the logical necessity of long range planning when the demands on schools require the schools to cover so many years of curriculum. (Good & Brophy, 1978)

(I.C.2.a.1.a.) The efficiency of learning is increased by long range plans that provide for increases in the performance standard as the learner progresses. The need for gradually

increasing performance standards was discussed as a principle of motivation. The fact that it fits in two part of the outline is a consequence of an outline where the categories overlap. If the ultimate standards were provided the immature learner when he began a new subject or skill, he would tend to be defeated by the enormity of the task and cease effort. Experienced teachers solve this problem by setting standards that consider the maturity of the learners, so they can accomplish the goal with a reasonable sustained effort. Then as the learner meets the standard and matures, the teacher adjusts the standard to a higher level to reflect the long range goals. The validity of this principle is partly based on democratic procedures and partly on the logic of dividing instruction into learning segments that can reasonably be achieved in days or weeks. (Good & Brophy, 1978)

(I.C.2.a.1.b.) The efficiency of learning is increased by long range plans that include comprehensive goals consistent with the purposes of the schools and the learner. This principle reminds us that society tends to assign too many expectations for schools and when this happens no one is satisfied. Part of school boards' responsibility is to delimit the purposes of the school to reasonable comprehensive goals. School boards are generally elected so they are authorized representatives of the people and the satisfy the demands of democracy in validating standards. When school boards are uncertain about what their constituents would have as long range goals, needs assessments are useful in giving the public a voice in the prioritization process. The validity of the principle is based on democratic procedures and the realization that it is easy for democracies to overload government institutions with unrealistic expectations which makes everyone unsatisfied with the institution.

(I.C.2.a.1.c.) The efficiency of learning is increased by having long range plans that can provide advance organizers to provide coherence, direction and terminology for daily plans. Without long range plans, daily plans would lack coherence, direction and consistent use of appropriate terms and language. Important concepts and key ideas might be slighted or left out of the curriculum. Theories are a type of advance organizer and some theories are vital to the learner in the modern scientific world. Long range plans provide advance organizers that facilitate the transfer of memory material from short to long term memory. Moving information from short to long term memory always requires effort. If the information is a random, unorganized collection, the effort in moving from short to long term memory is greater. If the information is organized in an elegant, simple form or structure, it is easier to transfer and easier to retrieve. Much of what is learned in school is expected to be stored in long term memory, so the way it is organized and filed becomes an important consideration in planning for instruction or learning. Long range plans facilitate a prioritized core of minimum expectations for all students. The amount of knowledge and skill available to modern learners makes a prioritized minimum standard important. No one can learn all there is to know any more, so establishing minimum essentials is increasingly important. The efficiency of learning is increased by taxonomies, theories, or models that serve as advance organizers for learners as they expand the depth and base of what is known about a subject. Taxonomies provide a structure for adding new concepts to the subject and they facilitate the retrieval of the information when it is needed. Many important objectives take years to achieve, so long range planning must occur or such objectives would only be achieved by accident. Hard to achieve objects are generally acquired gradually, so knowing when to increase the performance standard

is important to both sustained effort and ultimate performance. The validity of this principle is based on democratic procedures to justify the purposes of instruction, the scholarly acceptability of specific theories and taxonomies used as a semantic framework for learning and the cognitive memory research which documents the efficiency of learning when advance organizers exist. Justifying purposes by democratic processes has been discussed enough to say no more, but using the scholarly community to justify the selection of appropriate theories and taxonomies is new to the discussion. Since scholars tend to be the source of theories and taxonomies then it is logical to expect scholarly communities to justify the theories or terms to be used in organizing the study of their discipline. The professional literature of all the curriculum specialties that are relevant to the public school curriculum document the fact that discussions about what theories or taxonomies of concepts ought to provide the structure for the curriculum of the schools and those discussions become the justifications used by educators to support their curriculum choices. (Bruner, 1960) The cognitive memory research validates the contention that learning efficiency is increased by using well designed advanced organizers as vehicles for learning. (Higbee, 1977), (Ausubel, 1960) & (Walberg, 1986)

(I.C.2.a.2.a.) The efficiency, quality and scope of learning is increased by detailed plans that enable the teacher to facilitate "map" learning as opposed to "route" learning. "Map learning" is a phrase used by educators who are trying to plan programs that maximize the benefits of the program in terms of what is known about how the brain works. "Route learning" is the kind of learning that takes place when the objective of instruction is clear, precise and allows for efficient direct instruction to enable the learner to reach the objective. "Routes, then, are easy to use, but because of their inflexibility are very vulnerable and easily rendered inoperative by

changes in the route statement or the environment." (O'Keefe & Nadel, 1975) The analogy of a route is used because a learner enters an unfamiliar environment (city) and needs find a place or places. He or she needs directions that don't include too much detail or the route will be too confusing. Good route instruction gives just enough critical information to enable to learner to reach the desired spot. Too much information will be confusing and cause the learner to get lost. "Route learning" is desirable when new material is being introduced or when the learner is just starting the learning process. Routes may be critical to the learner in a new situation but gradually the learner begins to be familiar with the setting and he learns alternative ways to move about and the brain begins a mapping process. Brain research suggests that the brain processes wholes and parts simultaneously and learning involves both focused attention and peripheral perception (Caine & Caine, 1991) so planning that shifts from "route planning" to "map planning" encourages learners to take advantage of the richer effects of map learning. Planning by objectives,"route planning", tends to rely on extrinsic rewards since many specific school objectives are not apparently relevant to learners until many objectives have been acquired and extrinsic rewards tend to undermine intrinsic interest (Caine & Caine, 1991). Curriculum that is tightly organized around route learning allows insufficient time for learners to "map process" so typical programs do not facilitate the map learning process that brain research suggests could occur. The short term advantages of route learning make them so attractive in communities where test scores are so highly valued especially standardized tests. Unfortunately, the tendency to teach to the test further undermines the map learning process and the intrinsic motivation to learn as the brain facilitates learning. Map learning tends to be unique and different for each individual which makes standardized testing much more complex and more

costly. Complexity and high cost do not win much public support so educators will have to be pretty articulate to sell this kind of planning and program. Simple bottom line targets are easier to sell than the complex bottom lines of map learning.

The validity of the "route"/"map" distinction is based primarily on brain research which suggests that suggests that the brain is a parallel processor (Ornstein & Sobel, 1987) that processes wholes and parts simultaneously (Hart, 1975) and even when the attention is focused, peripheral perception occurs (O'Keef & Nadel, 1978). The route/map analogy was first used by O'Keefe and Nadel to explain spatial behavior. Using it as a planning context is a logical extension of principles of brain learning articulated by (Caine & Caine, 1975).

(I.C.2.a.2.a.1.) Memory is a part of map learning, but it functions differently for map learning than it does for route learning, consequently the optimum plan for memory map learning is different. Route learning memory is termed taxon memory (Caine & Caine, 1991) by the brain specialist and depends heavily on drill and practice as will be spelled out the optimum plan for taxon memory is elaborated. Map learning memory is termed locale memory by the brain specialists and it is based on the learners real life encounter with life. Because it based on real life encounters, the learner can generally recall what was encountered from the single encounter. In contrast taxon memory requires repeated response opportunities to guarantee memory. Isolated facts, number drills, sounds of the alphabet are examples of taxon memory items. Remembering a camping adventure, a field trip to see airplanes take off or solving a problem of how to get across a stream with out getting wet are examples of local memory events not likely to be forgotten quickly.

The efficiency of learning for locale memory is increased by using an optimum detailed plan of instruction as follows: Implement plans in the context of thematic mapping situations where subject boundaries are crossed regularly, where problem solving is posed to require inter and multi disciplinary quests and to provoke curiosity, where multiple sources are integrated to provide multi-sensory encounters to help students be aware of the brains capacity to create thematic maps on one encounter. Evaluation is based on the quality of encounters and creative mapping expressions. The scholarly community that studies the brain and how it works identifies two kinds of memory. One is the taxon memory where recitation, rehearsal, timed practice and spaced practice are the critical ingredients of the plan. The other kind of memory is the locale memory system which the brain activates in route and map learning. Locale memory can be accurate after one route encounter if the learner attends to the situation and is stimulated by the encounter; consequently the lesson plan for locale memory is built on multisensory experiences, problem solving efforts that jump from discipline to discipline in an effort resolve the curiosity provoked by circumstances or the drama of the teacher. The validity of this principle is based on findings about the brain, but is new enough that it doesn't have a long history of data collecting. (Caine & Caine, 1991)

(I.C.2.a.2.a.2.) Map learning involves parts and wholes as well as peripherals when learning has a focus, so planning for it requires multiple expectations or at least an awareness that not all of the consequences will be anticipated. Since threat or excessive pressure tend to make the brain "downshift" (causes the indexing function of the brain to deteriorate which produces a loss of flexibility, creativity and full use of the brain's capacity), then any program to facilitate map learning has to enable learners to experience relaxed alertness. Relaxed alertness requires

freedom from threat or emotional tension, so it has to involve the relationships between the teacher and students and the relationships between students and students. It is not an easy to enable that kind of community to develop because everyone in the room is a principle player, but some of the ways to some of the ways to achieve it have already been discussed in section so they will not be repeated here. (I.C.1.b.4). Planning for map learning means planning for a rich, thematic, full, integrated, multidisciplinary program where the learners experience an "orchestrated immersion" in a problem or problems that require learners to have multi and interdisciplinary encounters with the world effecting the problem. An abstract of the plan for map learning starts with the teaching having multiple expectations for the learners followed by posing problems to provoke curiosity, followed by the orchestrated immersion in all the subjects and disciplines which have a bearing on the solution to the problem accompanied by active processing followed by evaluation where the teacher experiences the wonder at the creative and unique solutions flowing out the individuals in the class.

The validity of this principle is based on logical extensions of principles of learning derived from brain research. (Caine & Caine, 1991)

(I.C.2.a.2.a.3.) Habits are slighted but important dimension in instructional planning because the behaviorist definition of habit was so narrow (conditioned response) that schools tended to slight the planning that was done to insure the habit goals useful to learners. The larger role of habit in the lives of learners was ignored because so many of our habits in schooling cycles were not conditioned responses. Now that the "eclipse" of our thinking generated by the narrow behaviorist view has passed, the more comprehensive definition of "habit" as an explanation of much useful behavior has had a return to legitimacy. (Young, 1988) Not only does Young make

a case for the legitimacy of a broader definition of "habit", but he also makes a case for "habit" as a positive virtue without which many of life's important tasks would be impossible. Young poses four significant advantages to "habit" and all four of them serve workers and especially teachers in useful ways. The first advantage is that habit can increase the skill with which actions can be performed. A habit can also decrease the skill with which actions can be performed. Senge points out that the habit of feeling powerless or unworthy can undermine learners capacity to acquire self-mastery (Senge, 1990) so habits can increase or decrease skilled performance. A learner's habit response to situations requiring an oral response can effect the efficiency with which he learns or masters habit a skill or a concept. A learner's habit response in the teacher's feedback or correction process can strengthen or weaken the motivation of the learner to learn. A learner's emotional habits can strengthen or weaken his or her interest in the subject of instruction. A learner's habit of attending to a presentation can inflence the rate with which he or she learns or memorizes. A learner's habit of using mnemonics to move short term memory items to long term memory can influence the efficiency of the learning. These few examples illustrate some habitual skills that are vital to learners that as with all habits take time, attention and focused practice to develop. The second advantage to having a habit is that habit diminishes fatigue. Much learning is hard work. Having habits that facilitate learning reduces the work involved. Learning the sounds of the alphebet, memorizing number facts, learning a new language, rehearsing concepts from social studies, science, health etc. are all learning activities requiring energy where the energy involved could be reduced by appropriate habits. The third advantage to habit is that it economizes the effort in the routine processes which are readily foreseen and thus frees the mind to attend more completely to the unforeseen. Since the

unforeseen occurs rather frequently when learners are assembled in schools, there is significant advantage to a learner who has the routines habitualized. Habit reduces the tension connected with normal operations and reduced tension reduces "mental downshifting" (Caine, 1991) so the mind is more perceptive to encompass all the events surrounding the new or the unforeseen. The fourth advantage to habit is that it economizes memory. A new learner's schooling day transpires without the benefit of accumulated memory of previous days; consequently the learner has to devote considerable mental effort to the new tasks. "Habit is a memory unconsciously edited for action" William James declared the "The more details of our daily life we can hand over to the effortless custody of automatism, the more our higher powers of mind will be set free for their own proper work." (James. 1890) Learners are participants in a school which is comparable to a three ring circus; consequently the memory and value conflict load is excessive. The economy of memory facilitated by habit enables the learner to function in the many rings of events with a minimum of stress so downshifting doesn't cut into the learner's ability to be attentive and perceive most of what is happening in the complexity of class events.

Many of the learner's habits will be intact when he or she starts school, but many will be developed in the process of schooling. The teacher who is aware of the vital role of habit to a learner is in a better position to plan a program that facilitates the change of poor habits and the acquisition of new habits that make the learner a more efficient, effective learner. The plan suggested for facilitating habit development is to begin the lesson with a definition or description of the intended habit followed by modeling of the habit in action for clarification followed by motive supported guided practice followed by independent habit practice followed by evaluation of the habit after sufficient time has elapsed for the habit to develop.

The validity of habit as slighted link in the tools of learning is based primarily on the scholarly work of Michael Young, but he cites (Young, 1988) some impressive early scholars (Dewey, Durkheim, Weber, James and Thoreau) who saw habit as an important dimension of learning.

(I.C.2.a.2.a.4.) The efficiency of learning attitudes in increased by detailed plans that enable the teacher to first energize with appropriate associations, recognize with appropriate associations, correct with appropriate associations and evaluate with appropriate associations. Attitudes in this document are expressions of preference, feeling, emotion, commitment, choice and bias. They represent internal mental or emotional states that underlay action, choice, preference, ethical standards and aesthetic standards. The fact that learners can falsify their internal mental states to avoid the consequences of moral judgments makes measurement or assessment of attitudes problematical. Some educators avoid the problem of assessing attitude objectives by not establishing any attitude purposes for instruction. Attitudes are so central to most purposes for schooling that most educators plan to stimulate their desired attitudes even though they encounter difficulty in the evaluations. The following sequence of events is the instructional design chosen for this theory in achieving attitude objectives:

Energizer	Recognizer	Corrector	Evaluation
paired with +	paired with +	paired with +	paired with +
Association	Association	Association	Association

Energizers are statements of purpose regarding the attitude, emotion, commitment, aesthetic standard or ethical rule which are the target of the lesson, so the lesson begins with an energizer.

If the lesson were directed toward appreciation of music written by Mozart, the energizer would describe the expectation and elaborate some of the benefits of appreciating music written by Mozart. Following the energizing presentation, the learners would have the occasion to listen to Mozart's music and if their behavior inferred appreciation, they would be recognized for their appropriate emotional response. If their behavior inferred no appreciation, they would be corrected. Energizers, recognizers, and corrections would all be stated or posed in a way that allowed for positive emotional associations to be possible during each phase of the lesson. Due to the possibility of falsifying emotional states to earn certain kinds of rewards, the evaluation would frequently have to done without conventional incentives. The validity of this principle is based on applications of learning principles, behaviorist psychology, cognitive psychology, brain research, communications theory and conventional wisdom. Very little research has been done specifically on the plan because attitude is the dependent variable which confounds measurement. Harris is responsible for the energize, recognize, correct pieces of the plan. (Harris, 1983)

(I.C.2.a.2.b.) To develop plans that efficiently facilitate "route" learning by a teachers being able to analyze the situation to develop detailed plans in terms of (1) the structure of the knowledge to be conveyed, (2) the ways to faultlessly communicate and (3) the behavioral response of the learner. Plans need to be developed to reduce the chance of failure due to poor teacher communication and to optimize learning efficiency and effectiveness. Differing types of purposes necessitate differing optimum arrangements for learning. Instructional scientists have elaborate categories of purposes that enable them to design instruction appropriate to the purposes and the instructional setting. Instructional programmers and materials developers find these strategies useful even when distinctions produce only subtle changes in the instructional

arrangement. In contrast, class room teachers run a multi-ring circus, so an elaborate taxonomy of purposes is a barrier to good instruction. No one facing the minute by minute complexity of the class room is able to sort and classify six types of cognitive objectives to identify optimum instructional procedures when adjustments have to be made many times a day. For this instructional theory, a decision was made to simplify the taxonomy of purposes as much as possible to gear it to the needs of the classroom practitioner. Four types of purposes with differing teaching procedures were selected and one was added because habit as a purpose has been slighted by the instructional community. Memory, concepts, skills and affect objectives plus habit objectives are the five instructional objectives used to establish patterns of instruction used in this theory .

(I.C.2.a.2.b.1.) The efficiency of learning taxon memory items is increased by using the optimum detailed plan of instruction as follows: Memory identity provided, followed by timed practice until learner reaches expected speed, followed by spaced practice for a long period (months or years) which is also the evaluation. Memory evaluations that terminate in two days, a week or even a month after the initial presentation are ignoring the reality of the memory curve. Trivial Pursuit and television programs that reward elaborate memories of facts that aren't functional to normal living alter the requirement for timed practice, but only a small segment of learners aspire to such learning. A sophisticated memory retrieval system is the critical ingredient in that kind of memory ability. Most of us evolve our retrieval systems out of the advance organizers of the subjects we have learned well enough to have the advance organizers intellectually alive to us. Memory experts have developed mnemonic category systems that facilitate retrieval, but they involve a considerable time investment to make them habits, which

would be valuable objective for all learners, but they aren't likely to become part of the basic equipment of all learners until teachers recognize the value and utility of such habits. The majority of taxon memory objectives that are critical to learners success in life are only useful if the learner has over-learned sufficiently to have a fast response when a response is needed. The sounds of the alphabet and math facts underlying number computation are not adequately learned for functional use if the learner can't produce them quickly when needed. For this reason, practice is not enough. The practice needs to be timed practice until the response speed is adequate to the functional use of the memory. Memory items of this importance also need to be available through out the life of the learner so the practice needs to be spaced over months and years to be sure they are permanent. The justification for detailed plan of instruction comes from the memory researchers and the research of instructional designers. (Higbee, 1976), Gagne', 1982)

(I.C.2.a.2.b.2.a.) The efficiency of learning is increased by detailed plans for teaching concepts. Concepts are classes of objects or ideas. Conceptual behavior is when the learner can generalize within classes and discriminate between classes. The most efficient way to learn to classify and discriminate non/example objects from examples is to present a definition of the concept and then present examples and non/examples of the concept until the learner can correctly classify or discriminate. The efficiency of the process can be further improved by careful selection of the examples and non/examples so that the range of the concept is adequately illustrated and boundaries of the concept are sharply exemplified. After the instruction has evolved to where the learner needs to be evaluated, then unencountered examples and non/examples need to be used to test the learner. Restating a memorized definition or classifying

examples that were used to instruct will risk the possibility that the learner has memorized the correct response rather than comprehending the concept. The validity of the direct instruction procedure for teaching a concept (the one just described) is the more efficient way to teach a concept, (Rosenshine & Stevens, 1986), but some times the learning purpose is to replicate the way scientists develop concepts. When that is the case the sequence of the instructional design changes.

(I.C.2.a.2.b.2.b.) When the purpose of concept instruction is intellectual excitement rather than efficiency of learning, the lesson plan sequence changes. Instead of starting the instruction with a definition, the teacher may start with a series of presentations of examples and non/examples being labeled with the concept combined with the request for a definition to fit the classifications reflected in the presentations. Such a procedure requires the learner to reflect about the relevant characteristics of the phenomena he is observing to see if he can isolate the key variables that discriminate the examples from the non/examples and thus give a definition of the concept. Such a procedure is time consuming and sometimes frustrating, but it can also be exciting and stimulating as scientists sometimes are when they observe new phenomena and study it to fit in their classification scheme. (Bruner, 1960) These two approaches to teaching concepts are classed as direct instruction and discovery instruction. The following abstraction of the two approaches may provide the reader with a more succinct description:

Direct instruction= Definition- Example/nonexample- Evaluation.

Discovery inst.= Example/nonexample- Definition- Evaluation.

The validity of the discovery approach to concept instruction is based more on the conventional wisdom of science and math teachers since the dependent variable become

excitement with learning rather than amount learned. Excitement is hard to measure as are all emotional responses so the research covering this principle is less clear. The advocates of discovery make up for the lack of data with enthusiasm and commitment to their cause so there is no lack of proponents for discovery instruction. Map learning relies on the discovery approach frequently although not all discovery learning is set up in the map learning context.

(I.C.2.a.2.b.3.) The efficiency of learning habits is increased by using plans that begin with a definition or description of the habit followed by a modeling of the application of the habit for clarification followed by motive supported guided practice so the learner will not develop incorrect habits, followed by independent practice so the habit becomes fixed, followed by evaluation. Since habit as dimension of learning has been slighted by the instructional community, there is reearch support for this planning format. This plan was based on the "skill" plan since habits are imbedded in many skills, but the validity of this prototype plan should remain in question until colleagues and practitioners have given it more of a test.

(I.C.2.a.2.b.4.) The efficiency of learning skills is increased by using detailed plans where the teacher uses a clear sequence of instruction to optimize instruction. Skills in this document are complex combinations of concepts, psychomotor sequences and procedural chains. Reading, writing, solving computational problems, typing, running and singing are skills by this definition. A more traditional definition of skill is a psychomotor skill which would exclude reading and arithmetic computation. The broader definition was taken for this document because we wanted a minimum number of categories and because all of these skills can be efficiently taught with the same general model of teaching. The model for teaching a skill is to (a) begin by modeling the skill, follow the modeling with (b) guided practice. After guided practice has

enabled the learner to be consistent in performing the skill then (b) provide independent practice followed finally (d) by evaluation. The more complex the skill or the higher the level of the performance sought, the longer the guided practice will have to be sustained. Professional athletes and professional writers continue to be coached (guided practice) all through their productive careers. The validity of this plan is well established in both research literature (Gagne',1982) and practice. The difficulty in the plan is the labor intensive nature of guided practice. Wealthy clients, potential stars and established stars get the guided practice they need because of the rewards to the coach. Slower students and less able students who need more guided practice tend to get less because the system doesn't provide enough teachers to cover the demand.

(I.C.2.a.2.b.5.) The efficiency of learning attitudes in increased by detailed plans that enable the teacher to first energize with appropriate associations, recognize with appropriate associations, correct with appropriate associations and evaluate with appropriate associations. Attitudes in this document are expressions of preference, feeling, emotion, commitment, choice and bias. They represent internal mental or emotional states that underlay action, choice, preference, ethical standards and aesthetic standards. The fact that learners can falsify their internal mental states to avoid the consequences of moral judgments makes measurement or assessment of attitudes problematical. Some educators avoid the problem of assessing attitude objectives by not establishing any attitude purposes for instruction. Attitudes are so central to most purposes for schooling that most educators plan to stimulate their desired attitudes even though they encounter difficulty in the evaluations. The following sequence of events is the instructional design chosen for this theory in achieving attitude objectives:

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(I.C.2.a.2.c.) The efficiency of learning is increased by daily plans that provide for the use of learning principles. Learning principles are teacher or student responses that facilitate effective learning. Two of the principles are tied to student responses and two are tied to teacher responses to student responses. They are as follows:

(I.C.2.a.2.c.1.) Learner response rate is positively correlated with amount learned especially for simple low level concepts. Complex student responses such as analysis responses or reflective evaluation responses will alter the reasonable response per minute expectations, but assuming the class of responses being observed are similar, the faster the response rate, the more the learner will learn. Response opportunities in classes of students vary rather widely even when the type of response is similar and assuming response types to be similar, the response rate correlates with amount learned. The validity of this principle is based on the research reported by Rosenshine. (Rosenshine & Stevens, 1986)

(I.C.2.a.2.c.2.) Feedback to the learner enables the learner to know when the response is correct or not. The quicker the feedback the better in most instances. Feedback facilitates learning, but if the feedback involves correcting errors, it is important that corrections be accompanied by motive support. Some learners have enough motive strength to handle corrections without motive support, but more will lose their desire to practice if corrections are given without motive support. Motive support was discussed in the section of the theory dealing with motivation. The validity of this principle is based on a good deal of behavioral research. (Rosenshine & Stevens, 1986; Skinner, 1953)

(I.C.2.a.2.c.3.) Amount of practice is positively correlated with the amount learned. Practice facilitates over learning and overlearning enables the learner to remember longer, apply the learning to more situations and to integrate what is learned with previously acquired knowledge. Under learned concepts are forgotten quicker, less available for use in solving practical problems and more likely to be "inert knowledge." Practice facilitates overlearning. The validity of this

principle is based on a good deal of behavioral research. (Bloom, 1976); Rosenshine & Stevens, 1986; Skinner 1953)

(I.C.2.a.2.c.4.) Modeling the appropriate conceptual response or skill facilitates learning. Teachers who enable their students to perceive a model of the skill or conceptual behavior they are teaching will increase the effectiveness of the learning. Modeling can be performed by the teacher, other students or simulations of the skill or behavior. Modeling is particularly critical in teaching for complex purposes such as skill development or problem solving. Modeling was cited as a way to motivate learning, but the research supporting that principle was negligible. Modeling for the purpose of increasing the efficiency of learning has some significant research to support its effectiveness. (Bandura, 1971) The difference in the research supporting modeling effect on learning stems primarily from the difficulty of measuring motivation compared to the difficulty of measuring learning.

(I.C.2.a.2.c.5.) The efficiency of learning is increased by daily plans that provide for use of principles of learning affecting memory. Taxon memorization is a lower level performance than conceptualizing, developing skill or problem solving, but it is a vital objective to some tasks, so learning principles relevant to taxon memory are important principles to learners and teachers.

(I.C.2.a.2.c.5.a.) Meaningful material is easier to memorize. Learners acquire meaning by previous experience, so a learners previous experience enables him to attribute meaning to an event, symbol or term. The more experience or meaning the material has to the learner, the easier the memorization process. The validity data is abundant and convincing. (Ebbinghause, 1903; Higbee, 1977)

(I.C.2.a.2.c.5.b.) Patterned or organized material is easier to memorize. Songs have rhythm patterns and pitch patterns, so songs facilitate memory of lyrics associated with the song. Some poetry has a rhythm pattern and a sound pattern and poetry is easy to memorize. Taxonomies generally have a logical pattern, so they provide an efficient way to memorize large amounts of information. The periodic chart of chemical elements is both a taxonomy and a logical organization of terms and information about chemical phenomena. The amount of information in the periodic chart would be much harder to remember if it weren't organized and presented in the chart form. The validity data on this principle is convincing. (Ellis, 1978; Higbee, 1977)

(I.C.2.a.2.c.5.c.) Feedback facilitates memorization. Without feedback, the learner would not know when an error was being practiced; consequently feedback is critical to memorization. Motive supported feedback is as important with a memory task as it is with a conceptual task because practice must continue to facilitate memory and corrective feedback risks undermining the motivation of the learner. One of the reasons for the success of programmed material is that it provides feedback without motive connotations, so when feedback comes from the teacher it should be motive supported or it will undermine motivations. The validity research is sufficient to be convincing. (Ellis, 1978; Higbee, 1977)

(I.C.2.a.2.c.5.d.) Repetition or practice facilitates memorization. The only time where memorization can be adequate with out practice is when it is locale memory or the emotions associated with the learning are so high that one exposure is sufficient. Most learning situations are not accompanied by sufficient emotion to produce overlearned memorization, so repetition is necessary. The validity data is sufficient to justify consistent use of this principle. (Ellis, 1978; Higbee, 1977)

(I.C.2.a.2.c.5.e.) Recitation facilitates memorization. Recitation facilitates memorization because it combines practice and feedback. The learner can hear his own recitation so he is getting quick, automatic feedback and he is practicing as he recites. The research justifying this principle is as convincing as the explanation for it usefulness. (Ellis, 1978; Higbee, 1977)

(I.C.2.a.2.c.5.f.) Interference reduces the effectiveness of memorization. Interference can come from a number of sources and the research justifying its existence is convincing. (Ellis, 1978; Higbee, 1977)

(I.C.2.a.2.c.5.f.1.) Interference reduces the effectiveness of memorization and underlearning of the memory task contributes to interference. Underlearning of any memory task reduces the learners ability to use what he has memorized. Underlearned foreign languages will interfere more with the learning of a subsequent language. Overlearning a foreign language facilitates the learning of a new language. Overlearning musical compositions facilitates the learning of new compositions. Underlearning a musical composition will interfere with the learning of a new composition. The validity of this principle is fairly well researched and the anecdotal evidence is so strong that practitioners accept it with little question. (Ellis, 1978; Higbee, 1977)

(I.C.2.a.2.c.5.f.2.) Interference reduces the effectiveness of memorization and distracting activities interfere with memorization. Distracting activities can be noises, conversations, music or TV being heard while trying to memorize the vocabulary of a foreign language. The validity evidence is convincing, but the anecdotal evidence is so strong that few question the validity of the principle. (Ellis, 1978; Higbee,1977)

(I.C.2.a.2.c.5.f.3.) Interference reduces the effectiveness of memorization effort and learning highly similar tasks that require the learner to detect very subtle differences is a form of

interference. Memorizing that requires the learner to distinguish between two very similar symbols causes interference for the learner. It requires the learner to ignore the many common features and concentrate on the minimum essentials and that is inherently hard to do. The validity of this principle is well established especially to teaching practitioners who encounter so many instances of it. (Ellis, 1978; Higbee, 1977)

(I.C.2.a.2.c.5.f.4.) Interference reduces the effectiveness of memorization effort and having to use the memorized material in different contexts from where the original memorization was done causes interference. Memorizing a foreign vocabulary in the inherently distracting context of living in a foreign country is hard to do. Most beginners progress faster if they do their initial memory work in a non distracting environment such as a class room with no windows. As the memorization proceeds, the context in which the memorization occurs will interfere with the learners ability to use the language if the memorization context does not increase in complexity with the increasing skill of the learner. Eventually foreign language has to be used in the full blown complexity of the foreign country or it isn't adequately overlearned for that kind of use. Memorization is limited in its applicability by the situations in which it is practiced. An actor who only memorizes and rehearses his lines in the context of his study will find he has not adequately over learned when he gets on stage. The new context will interfere with his memory and he will err in new ways from his study rehearsals.(Ellis, 1978; Higbee, 1977) The validity of this principle is particularly abundant via anecdote so most teachers accept it without examining the research.

(I.C.2.a.2.d.) The efficiency of learning is increased by daily plans that provide for multisensory perceptions. Multi-sensory perceptions enable the learner to have more semantic

connections between the symbol that represents some phenomena and the phenomena it self. Multi-sensory perceptions facilitate locale memory. The broader the experience connection between the symbols and the reality, the less the room for confusion or error. The memory principles emphasize this principle. The more experience a learner has had with an object, the easier it is to remember. The more perceptual encounters a learner has had with phenomena, the better his grasp of the phenomena. Especially in a modern world where many encounters with the world occur through the myopia of the TV camera, the risk of false concepts is high. First hand encounters generally allow the learner to have multi sensory encounters with what he is learning so the learning is not so susceptible to misconception. The schools are not extravagantly financed, so teachers frequently have to teach concepts without multi-sensory experience for the lack of resources, but the compromise increases the mislearning where media takes the place of first hand encounters. The validity of this principle tends to be accepted by teachers before research was done because the logic is so convincing. The brain research is currently adding to the validity data in support of this principle. (Caine & Caine, 1991; Rosenshine & Stevens, 1986),

(I.C.2.a.2.e.) The efficiency of learning is increased by daily plans that provide for systematic variation of instructional setting to enhance transfer. Concepts and memory are useful in situations similar to those in which they are acquired. If the concepts or memories are to be used other situations, then practice at its use has to occur in situations similar to use. Skill use has the same limitation. Skills practiced in a protected environment will deteriorate under the pressure of use in complex situations different from practice. Swimming in a pool is not the same as swimming in a violent surf or a dangerous river rapid. An excellent swimmer can panic

in complex situations and his skill will deteriorate. Navigating according to the book in the safety of a college campus is quite different from navigating a sail boat at sea under storm conditions. Learning situations have to approximate the use situations or learners may fail to transfer what they learned in class to solve real world problems. Most schools do not have the financial support to implement the ramifications of this principle. For that reason most schooling does not facilitate the transfer it aspires to facilitate. The research supporting this principle is not abundant because the research is so difficult to carry out, (Cormier & Hagman, 1987; Ellis, 1978) but the logic underlying it is sufficient to convince those who know it to be convinced.

(I.C.2.a.3.) The efficiency of learning is increased by frequent evaluations congruent with practice. Particularly for learners whose motivation is strongly influenced by the teacher, evaluations provide the confirmation of the stated expectations. A teacher who announces a goal or an expectation, but then never alludes to the expectation again will find that many of the students have forgotten the goal or behaved as if the goal wasn't real. The longer the time lapse between the goal statement and the first evaluation, the fewer the students that will have maintained the effort to achieve the goal, so evaluations need to be frequent, or learning will be less. This principle has less effect on self-directed learners, but even they are motivated by teacher expectations and teacher expectations that aren't supported by evaluations have less impact on learning. The validity of this principle is based on considerable research. (Rosenshine & Stevens, 1986; U.S. Department of Education, 1986)

(I.C.2.a.4.) The efficiency of learning is increased by using evaluation data to adjust subsequent instruction. When learners are ahead or behind the teacher, learning efficiency drops. Evaluation tells the teacher when students are ahead or behind the instruction. If the teacher

ignores this data, then learning efficiency is reduced. The logical support for this principle is convincing, but so is the empirical research. (Rosenshine & Stevens, 1986; U.S. Department of Education, 1986)

(I.C.2.b.) Planning precedes implementing and implementing can alter plans especially for teachers. Teachers function as ring masters in a multi-ring circus, so it is inevitable that changes be made as instruction develops. The fact that teachers adjust plans as they teach does not negate planning. Without planning, the basis for adjusting would be weaker and less consistent with good teaching. With sufficient planning the teacher is more adequately prepared to program for good instruction on the spot. The validity of this assertion is based more on logic and reason than empirical research.

(I.C.2.b.1.a.) The efficiency of learning is increased by effective use of time. The pace of instruction is a significant factor in learner attention and in learner responding. Slow, deliberate instruction is helpful when learners are beginning a new encounter, fearing what might happen and lacking knowledge. Fast paced instruction and rapid response rates are stimulating when a learner has become proficient but needs further repetition to develop mastery. Rapidly paced direct instruction can be emotionally stimulating even when the learner has mastered the material. When hard new material is being presented, a slow deliberate pace is crucial to learning because the learner needs to feel a sense of accomplishment. Covering new material too fast tends to discourage a learner and undermine motive for learning. The validity of this principle is based on reason and some research. (Brophy & Good, 1986)

(I.C.2.b.1.b.) The efficiency of learning is increased by the effective use of time and a way to squander time is in transitions between types of instruction. Typical classrooms change the

subject of study many times a day and if transitions take five or ten minutes each as compared to a minute or less, then some classes have an hour less a day in which to learn. Learning rate is correlated with the amount of time spent at it so transitions become an important variable in the effectiveness of instruction. The logic of this principle supports the validity of it but so does the empirical research. (Brophy & Good, 1986)

(I.C.2.b.2.a.) The efficiency of learning is increased and broadened by consistently allowing students to meet their own expectations and orchestrating total immersion, relaxed alertness and active processing when map learning plans are implemented. Thematic instruction, integrated learning, problem solving, orchestrated total immersion, active processing in an environment that promote relaxed alertness describe a program designed to take advantage of the way brain processes the world around it. (Caine & Caine, 1991) Brain research and some programs support these conclusions, and the field is new and developing.

(I.C.2.b.2.b.) The efficiency of learning is increased by consistently holding students accountable for assignments when route learning is implemented. Assignments given but not checked or evaluated will only be done by a few and the longer the assignments go ignored, the fewer the students that will do them. This principle is a logical extension of the principle of giving frequent evaluations consistent with practice. Without evaluations the amount of learning will depend mostly on the learners interests, drives and needs and while there are some benefits to self-directed learners (Steffens, 1931) the over-all standard of performance for learners will decrease significantly is the teacher's consistency of evaluation is left out of the learning equation. (Rosenshine & Stevens, 1986; U.S. Department of Education, 1986)

(I.C.2.b.2.c.) The efficiency of learning is increased by consistently supporting class standards of behavior. Poorly behaved classes disrupt and distract learners from the tasks of learning so a good learning environment requires some classroom standards that support a good learning environment. Most teachers initiate rules for class conduct, but consistency in supporting those rules is as important as having the rules and being consistent is a difficult habit to develop especially in the context of the multi-ringed class a teacher directs. The validity of this principle has some research support and considerable support from the conventional wisdom of experienced teachers. (Good & Brophy, 1986)

(I.C.2.b.2.d.) The efficiency of learning is increased by consistently using the plans and principles associated with the plans. Plans can have no learning impact if they are not used. Principles of instruction or learning will not apply if they are not used. Consistency is the achilles heel of effective teaching. The validity of this principle has been discussed under each principle associated with planning so will not be restated.

(I.C.2.b.3.) The efficiency of learning is increased by persistence at tasks that require sustained effort. Some of the most important purposes of schooling (persistence in the face of failure, deferring gratification to achieve long range goals, self-confidence, mastering a foreign language and mastering higher mathematics) require sustained effort over time. Learners who do not persist at difficult learning tasks or teachers who do not expect learners to persist will decrease the efficiency of the kinds of learning that require persistence. Anecdotal accounts, reason and empirical research all support the validity of this principle. (Brophy & Good, 1986)

(I.C.2.b.4.) The efficiency of learning is increased by carefully attending to students. Teachers who know what learners are doing can reinforce, correct, stimulate, adjust instruction

at appropriate times. Teachers who are not attending to students while teaching and managing will be less effective teachers and learning will be less. Kounin (Kounin, 1977) labeled this quality withitness, but his research did not validate the principle. He verified the relationship between withitness and an orderly classroom. The connection between an orderly classroom and learning effectiveness was made by other researchers. (Good & Brophy, 1978)

(II.) Any list of instructional or normative principles designed for application in teaching or learning will generate issues or dilemmas in the application, so any theory of instruction has to accommodate those potential dilemmas or the theory is too simplified to accommodate reality. The Berlaks developed most of the dilemmas used in this theory and they classified them as the control set, the curriculum set and the societal set. Dilemmas are choices between alternatives which are equally desirable or undesirable. Any time a set of rules exist, people subject to those rules will have to resolve dilemmas created by circumstances where participants have to decide which rule is the more important rule to follow under the circumstances. Teachers and learners function in communities that have rules affecting learning, so teachers and learners have to resolve the dilemmas they encounter. Classifying dilemmas will help teachers anticipate, so the resolution of the conflict is less traumatic and debilitating to the teacher.

(II.A.) Control set dilemmas are dilemmas inherent to controlling the time and behavior of learners in a learning context. All communities or groups that function together have to have community rules and procedures to survive as groups and when ever a set of rules exist then circumstances will produce issues where participants must resolve a dilemma to continue functioning as a group. The following dilemmas are inherent in the control of a group of learners:

(II.A.1.) The whole child verses the child as a student is a dilemma to a teacher because the teacher's role with children is restricted to schooling. Parents of children are expected to accommodate the needs and drives of the whole child, but teachers have a more restricted role. The teacher may have a restricted role with learners compared to parents, but learner attitude toward learning is affected by all of the events he experiences, so teachers can perform their teaching better if they know more about a learner or if their contact with the learner is broader or more holistic. For this reason, good teachers are faced with a dilemma. If they compartmentalize their professional role with the child as the society expects, then they reduce their influence for more learning. If they get involved in the whole life of their learners, they run the risk of parental reprimand or personal burn out. Every teacher faces and resolves this dilemma and the quality of their lives and their teaching is affected by how they resolve it.

(II.A.2.a.) The teacher's control of time verses the child's control of time is a dilemma that all teachers face and resolve. Some teachers control virtually all of the learner's time and some (Summerhill) allow the learners to control virtually all of their time. Most teachers control learner time in basic studies such as reading and arithmetic and give the learners more control in subjects such as art or music appreciation. The younger the learner, the more teachers tend to assume control of their learning time, but even in college, teachers control the learner's use of time in some learning. Language practice, student teaching, laboratory experiments and sports skills are some common teacher controlled learning activities in college. The justifications of teacher controlled time are learning efficiency, the need for guided feedback to avoid mislearning and guaranteeing the child's learning. The justifications for learner control of learning time are encouraging the learner to be self- directed and self-motivated. Too many

school graduates avoid learning activities when they leave the controlling influence of the teacher or the parent, so teacher's desire to shift the responsibility for learning from the teacher to the learner is a long range goal. It is a dilemma to know when and to what extent this shift should take place for maximum learner growth and responsibility.

(II.A.2.b.) The teacher's control of operations verses the child's control of operations is a dilemma that all teachers face and resolve. Operations are the behaviors, the content or the substance of the curriculum. The justification for having teachers control operations is their age, wisdom and knowledge of what beginning learners should know and become from attending schools. The justification for having learners control some or all the operations of schooling is to enable them to become responsible self-directed learners who accept responsibility for their own behavior and knowledge. The percentage of learners who leave formal schooling unable or unwilling to assume responsibility for what they learn or become makes a case for schools assuming less operational control over students so they can become more responsible. It is a dilemma to know when and to what extent teachers ought to assume operational control over student behavior verses students assuming more self-control. The dilemma affects both the efficiency and the end result of the learning operation.

(II.A.2.c.) The teacher's control of standards verses the child's control of standards is a dilemma common to all teachers. Standards are the quality expectations that a learner has to achieve in any learning accomplishment. Standards are set by professional associations, by leading scholars, by safety rules, by social demand and sometimes by legislation, so teachers are expected to be aware of standards to enable students to conform to the standards; however if learners do not subscribe to the standards for their performance, they can subvert the process.

The goal of the school is have students accept and assume the standards. Learners conform to standards more strenuously if they have a part in setting them, so teachers face a dilemma in knowing when and how to involve students in controlling the standards of their performance.

(II.A.3.) Teachers face a dilemma in resolving the conflict between the need for social control and the desire for individual justice. Social control is a community necessity to effective learning. Learning efficiency is reduced if their is limited or ineffective social control. The dilemma develops in the process of maintaining the order that social control demands. Misbehavior must be controlled by having consequences that discourage misbehavior. Either the teacher or the class or the system must administer the consequences for improper or proper behavior. If desirable or undesirable consequences are administered unfairly, then individual justice is sacrificed to achieve social order. Unfair administration of consequences doesn't seem to pose the typical dilemma until one faces the reality in social systems that status learners expect to have an unfair advantage in the administration of consequences so they will disrupt the social order to protect their advantage. Then the teacher is faced with a real dilemma. Social order is much easier to administer if the social class lines aren't disrupted, so social order verses individual justice becomes a dilemma.

(II.A.4.) Teachers face a dilemma in resolving the inherent conflict between the orderly behavior of learners and the intensity of the learning situation. Social order is expected in the customary class. Learning intensity is desirable because it reduces the need for repetition or practice and it also contributes to the positive attitude of the learner. Unfortunately intense learners are not always quiet and orderly. If a large group of them are involved, high intensity can make a rather noisy, disruptive group. All teachers learn this lesson rather quickly. Some

teachers have such a strong commitment to learners being intense that they ignore the noise it produces, but even the teachers most committed to emotional learning intensity will find ways to compromise with the extremes of this dilemma.

(II.B.) The curriculum set of dilemmas are dilemmas connected with how schools and teachers transmit knowledge, ways of knowing and learning. The philosophical terms used to label these kind of dilemmas are metaphysics and epistemology. Metaphysics deals with what is real and epistemology deals with how we know and learn what is real. Metaphysical and epistemological issue are not new issues. They have been part of philosophical discourse for centuries. Since teachers can never sit the fence on dilemmas of knowledge, reality and ways of knowing, then knowingly or unknowingly they resolve these dilemmas and how they do affects the quality of their programs.

(II.B.1.) Public knowledge verses personal knowledge is a dilemma that teachers have to resolve in planning the curriculum. Public knowledge represents the accumulated wisdom and traditions of the ages and learners are expected to know enough to live, work and serve in a world where this knowledge serves as a back drop to effective government and dialogue. A number of well known authors (Bennett, Kozol, and Hirsch) take this stance so it is part of the public pressure for the schools to provide the public knowledge. Personal knowledge advocates contend that the only real knowledge is the information the learner can functionally relate to what he already knows. Curriculum that requires the learner to acquire catalogues of traditional information without regard for how the learner can integrate it into his existing knowledge bank is promoting inert knowledge. Inert knowledge produces a "mental dry rot" and a number of modern authors have expanded the theme of personal knowledge (Carl Rogers, John Holt, and

A.S. Neill). Whitehead's phrase "mental dry rot" is a frequently quoted phrase to argue for personal knowledge, but Whitehead was really trying to resolve the dilemma between public knowledge and personal knowledge so he has some good counsel for teachers who also have to resolve that conflict in their curriculum for learners.

(II.B.2.) Knowledge as content verses knowledge as process is another epistemological dilemma that teachers have to resolve. Knowledge as content focuses on significant names, facts, generalizations, concepts and theories. Knowledge as process focuses on how scientists or scholars gain the knowledge. Among the sciences, how knowledge is acquired is as important as the concepts and theories are, so science teachers tend to lean toward knowledge as process. Standardized tests are weighted in the direction of knowledge as content, so test scores push the curriculum in the knowledge as content direction. All teachers have to resolve this dilemma as they teach and the more aware they are of the choice they made, the more defensible their position.

(II.B.3.) Knowledge as given verses knowledge as problematical is an epistemological problem that teachers have to resolve. Knowledge as given is an easier, more simplistic version of the world than knowledge as problematical; consequently teaching as if knowledge were given is easier and requires less knowledge of the teacher. Knowledge as problematical treats knowledge as tentative, provisional, constructed, evolving etc. and the more a scholar knows about a subject, the more aware they are of the problematical nature of the subject. Elementary teachers tend to be broadly educated rather than scholars in one subject, so they frequently lack the expertise to understand the problematical quality of what they teach. For this reason, this dilemma is more of a problem in the elementary schools than it is at higher levels. Most

philosophers of science lean toward knowledge as problematic so this dilemma is not a real one to them. Elementary teachers, however, are not trained as philosophers of science, so to them the dilemma is real and needing resolution.

(II.B.4.) Intrinsic motivation verses extrinsic motivation is a teaching dilemma. Intrinsic motivation comes from within the learner. Extrinsic motivation comes from points, stars, recognition, rewards, praise, punishment etc. It is easier to give examples of extrinsic motivation than it is intrinsic because extrinsic examples are easier to perceive and because they probably get used more. Intrinsic motivation has more appeal because it is self-sustaining but achieving it is problematical so the realists argue it isn't practical to expect learners to be intrinsically motivated. Intrinsic motivation verses extrinsic motivation represents a real dilemma to teachers.

(II.B.5.) Learning is holistic verses learning is molecular is a modern school dilemma. As specialization has increased so has the molecularization of subjects. The sub-dividing of subjects to enable learning to occur in more manageable pieces has had positive and negative effects. It is easier to learn when the tasks are sub-divided and small but putting the pieces back together so learners see the relevance and importance of what is learned is hard and many teachers lack the perspective to do it. Teacher education has followed the trends toward increased compartmentalization and specialization that has characterized higher education and with good reason. The skills, attitudes, habits and conceptual preparation required of an effective first grade teacher are significantly different than they are for sixth grade teacher or high school math teacher or junior high school science teacher or an English teacher or physical education teacher or an art teacher or a music teacher etc., but the trend has had negative consequences. Even at the elementary school level there has been an increased compartmentalization and specialization

of teaching roles with out adequate integration and interconnectedness between the special subjects. At the secondary and college level the problem is much worse so learners frequently fail to see the connections between the various pieces of what is learned and life's problems so relevance and motivation to learn are undermined. Because the academic community places such a high value on scholarship which is generally achieved by penetrating the frontiers of knowledge a. a specialist, the values of the academic community make aspiring scholars uncomfortable with the integrative, connective role of a teacher or a scholar who chooses to make integration and connections his scholarly focus. Helping learners know how various disciplines interconnect puts the scholar in a role that violates his standards of intellectual honesty since he normally can't know enough about other disciplines to portray the interconnections. It is one of the dilemmas inherent to being a teacher. If you conform to that scholarly standard of only teaching that which you know from extensive research, then you will err on the side of portraying the subject you teach in the compartmentalized, fragmented way you learned it as graduate student or scholar. If you conform to the standard of teaching how the subject relates to other subjects and interconnects with other fields of learning then you will err in some of what you teach because no one knows all there is to know about all subjects. The present system leans toward a compartmentalized, fragmented curriculum with few attempts at integration and the more specialized knowledge becomes the worse the problem becomes. Molecular learning is confusing to learners because the parts don't always have a clear meaning nor is their relationship to the whole always clear. Teaching reading as a holistic process requires the teacher to have a clear notion of reading as a complex, holistic process to make sure the program achieves the desired goal. In contrast, breaking reading into decoding,

semantics, etc. allows the teacher to develop very specific strategies for teaching those parts. The difficulty comes in combining the parts into a plausible, meaningful whole; consequently the teacher faces a dilemma. Reading is not the only subject where this dilemma applies. Arithmetic, writing, art, music, science etc. are all subjects where this dilemma has to be resolved. The resolution can't be all holistic or lots of learners will be defeated by their particular molecular deficiency and it can't be all molecular or many learners will never understand the connection between the specific things they have learned and the complex holistic skill toward which their sub-skills apply. This dilemma is real and pervasive, so teachers have to find ways to resolve it.

(II.B.6.) Each child is unique verses children have shared characteristics is a schooling dilemma for all ages. Schools organize learners into groups so it is inevitable that teachers would organize instruction to fit the shared characteristics of the learners. The equally obvious differences between learners promotes the treatment of learners as individuals. The compromise point between the ideal and the practical is the dilemma decision point and varies from teacher to teacher. Teaching is much easier task if children are thought about in terms of their shared characteristics so the resolution of this dilemma will tend to shift in that direction with experience if the teacher does not make a continuous effort to control the drift. The number of students a teacher has to serve also affects the resolution of the dilemma. One on one education is still too expensive a treatment except for the wealthy few.

(II.B.7.) Learning is social verses learning is individual is a dilemma that might well be grouped under the societal set, but the Berlaks have grouped it with the curriculum set. Social learning facilitates the development of democratic attitudes and skills, increases learning rate

when cooperative learning procedures are used and facilitates a community where social, intellectual spiritual values are fostered. Individual learning can be inhibited by social interaction in some situations and with some learners as the learning takes place. Individual learning facilitates the progress of self-directed, self-moving learners who do need the social stimulus to individual effort. Learning as an individual is harder to monitor and provide guided practice to each learner as he or she acquires skills so keeping track of individuals is more difficult. Learning as individual facilitates more diversity but it increases the teacher's difficulty in providing relevant feedback as the learner needs feedback and correction. The present fashions of preference lean in the direction of learning as social, but fashions of preference change as teachers resolve dilemmas too strongly in a given direction.

(II.B.8.) The child as a person verses the child as a client is a dilemma evolving out of the professionalization of teachers. This dilemma captures the conflicting orientations within the professional community towards the people they serve. The child as a person stance expects the teacher to perceive each learner as a unique individual with feelings, experiences, attitudes, concepts etc. that are individual. Teachers who function this way tend to become involved with their students and feel what they feel as well as know what they know. In contrast, some professionals are trained to be objective and distant so emotions do not cloud professional judgment. For them the child is a client and distance is vital to the objective dispassionate stance they seek. Difficult choices are more objectively made by professionals who treat their students as clients rather that persons. The passage of time and normal rotation of students through the years tends to move teachers in the direction of the child as a client if the teacher makes no conscious effort to avoid the tendency.

(II.B.9) Complexity verses simplicity is a dilemma inherent to teaching and to theory building. Both teaching and theory building require the developer to provide a description, a formula or some kind of an explanation for the curriculum or theory being proposed. The simpler the explanation, the description or the formula, the more elegant and powerful it is for memory purposes and utility purposes, but it also has to be complex enough to comprehensively account for the reality of the world or it serves no purpose as a curriculum or a theory. For this reason teachers and theorists always have to resolve this dilemma as the teach or develop theories. Neither the Berlaks nor this author posed this dilemma. A fellow teacher who read the theory posed it. (Bahr, 1990)

(II.C.) Societal dilemmas are issues inherent to schools since schools are miniature societies. Public schools always involve societal issues since no public schools are sufficiently endowed to offer one on one teaching.

(II.C.1.) Childhood continuous verses childhood unique is a dilemma that is peculiar to elementary schools. The childhood is continuous advocates seek to help children to understand any problem or issue that might come up regardless of the delicacy of the topic. Controversial strikes, birth control, social diseases and racial prejudice are topics that ought to be discussed at the level of the understanding of the child when they naturally occur. In contrast, the childhood is unique advocates contend that childhood is a special period in life where certain problems can not be understood so children ought to be protected from exposure to such problems until they reach a more mature state. The Berlaks were clearly on the childhood is continuous side of this dilemma, but they did pose it as a real dilemma which is a way of giving

credibility to a different stance. In the world at large, the dilemma is real, so it has to be resolved by teachers which will affect the way schools are conducted.

(II.C.2.) Equal allocation of resources verses differential allocation of resources is a dilemma that is harder to resolve with the increased twentieth century emphasis on equality of opportunity. Historically, certain classes, groups, families etc were expected to have the lions share of the resources allocated to them. Equality of opportunity has disrupted that notion, but traditions change with great difficulty, so this dilemma is fraught with considerable emotion. Special treatment to handicapped groups, to racially discriminated groups, and to poorer groups have been consequences of the guilt feelings about historical inequalities, but such solutions repeat the ills of earlier societies so the dilemma continues with new inequities requiring future solutions.

(II.C.3.) Equal justice under law verses ad hoc application of rules is a dilemma to most school teachers. They concede the importance of the principle of equal justice, but in the application process they find many important reasons to adjust the application of the rules to accommodate individual variations in intention, entry level skills, social back ground etc. Even the legal system faces this dilemma since motive or intent is always part of the trial process. Consequences are always meted out in terms of the motive of the defendant, so equal justice always assumes adjustments in consequences to fit the motive or intent of the accused. Teachers have to solve practical problems in the same way, so a dilemma always exists in the application of the rules or law.

(II.C.4.) Common culture verses sub-group consciousness is a dilemma inherent to democracies. Democracies depend on a common culture to facilitate the governing process, but

Western Democracies also emphasize the legitimacy of sub-groups having a defensible identity that allows them rules and norms that go beyond the common culture's rules and requirements. Since schools operate in the context of both the common culture and the sub-groups, teacher have to resolve the dilemmas inherent in promoting the common culture while respecting the sub-group variation on the common culture. The potential for these kind of dilemmas in countries such as U.S. is great because the common U.S. culture accommodates so many radically different sub-groups.

Despite the fact that dilemma language allows the scientific observer to systematically observe some of the conflict reality inherent in classrooms, it is still a pale approximation of the reality of schools, so scientists and practitioners be aware. The dilemmas posed in this theory tend to be global rather than precise generalizations; therefore they distort. If this theory is useful in describing and explaining instruction, it may be necessary to increase the kinds of dilemmas, or organize them differently, or state them more precisely, or reduce the number by consolidating them into larger categories. What ever the direction the development of this theory may take, if it is a positive one, it will be because the educational community probed it, contradicted it, refined it and found better ways to put it together so that it served both the theorist and the practitioner better in describing, explaining and predicting the effect of instruction.

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Damon Bahr suggested a dilemma that seemed to have many applications after he had a conversation about dilemmas on the 17th of July 1990.